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The Function of the Imagination in Structural and Decorative Art.

THE influence of the imagination on the progress of structural art is a subject which has never yet received the attention which it deserves. The very word design, indeed, involves the idea of imaginative action. A perception of the special stamp which indicates, to the educated eye, not only the work of a great designer, but the work of an individual designer, is a tacit recognition of the imaginative power of the artist in question. But for a distinct analysis of the art of design, showing the office and function of the imagination in their proper light, we shal look in vain. Not only is this the case, as a fact, but it is possible to explain why it is the case. The outline of all human thought, in so far as it had been conceived by Grecian philosophy 2,000 years ago, was laid down by Aristotle. Those who are unacquainted with the works of that master of the domain of reason have little notion how thoroughly he did this work, once and for all. It is not too much to say that he impressed on all the subjects of which he treated the general form which they have since retained. Either directly or at second-hand succeeding teachers of mankind among European races have fallen into the grooves of thought marked out by Aristotle. There is, for this reason, a considerable difference between the form of those studies which were, more or less, in progress in the time of Alexander the Great, and those which have, if not altogether sprung up, yet first attained considerable proportions, since his time. This, also, has been the case, to a very great extent, with structural art. Architecture, indeed, had defined her classic orders at the period to which we refer. But her range was limited, both as to object of building and as to the adaptation to climate. And in that portion of the writings of Aristotle which may be thought rather to have misdirected the mind as to study of the imagination, architecture is not referred to. Music, together with the various species of poetry, and especially the drama, are described in the Poetics of Aristotle as imitations. "They differ as imitating, by instruments generically different, different things, in different manners." It has been most natural to extend this analytic definition to painting and to sculpture. And this being done, it is obvious that it would occur to few to exclude from the analysis the imaginative element of architecture. That imagination is another form for imitation has thus become tacitly admitted by most thinkers and writers on the subject. And if, it might be said, the action of the most purely poetic faculty, that of the bard or dramatist, who uses only the intellectual mechanism of language, is imitation, what higher rank can be assigned to material working in stone, in clay, or in metal?

This, we think, will be found to be a fair statement of the ordinary view of the elementary nature of art, whether fine or structural. It is clear that if this view be incorrect, the advance of art is likely to be impeded by the error. We absolutely challenge the truth of such a view. We consider it both false and mischievous. And it is, in the first instance, to the creations of the engineer rather than to that of the architect, the painter, the sculptor, or the poet, that we turn for proof. Let us regard, for a moment, what we may call the central mechanical invention, the wheel revolving on an axle. It is impossible to speak of this as, in the first instance, an imitative work. It is a means perfectly adapted to its end, but it resembles nothing in nature. If we seek for an illustration in the movement of the planets, we see at once how thoroughly distinct is the idea of a spheroidal body, circulating freely in space, in obedience to the unseen bonds of gravity, and the couple of mechanical elements, formed by human art out of unyielding materials, one of which is left free to move in one prescribed path, and in no other. Even if we were to allow,—which it would be fantastic to do,—that the man who first put wheels to a chariot sought to imitate the motion of the sun, it is incontestable that the method by which such slight resemblance as there may be was attained was altogether original. So far as we can speak, the wheel, revolving on the axle, is a creation of the human mind. When the master idea is carried out into a train of sequence, and when we have wheels driving wheels, by cogs, teeth, or bands, we advance in a complex organisation of which nature furnishes no pattern or example. It may at times be the case that the mechanic does imitate nature. He may derive the idea of a particular movement, or form a kinematic pair of elements, directly from some part of the animal structure. Or his own original design, intended, under certain conditions, to secure certain movements, may make use of arrangements almost identical with some of those which have been long since exemplified in the structure of the vertebrate skeleton. The hip joint is a favourite illustration. But though the round process by which this most important bone fits into its socket is a case of the connexion called the ball-and-socket joint, it is by no means true that a mechanical ball-and-socket joint is a direct imitation of the articulation found in a skeleton. It usually differs from it essentially, in as much as the ball is gripped by the socket, instead of being held in its place by any analogue of the *ligamentum teres*. In fact, a mechanical joint is as much better for an organisation of metal and of wood, than any copy of the animal articulation could be, as the latter is, for its own special service, if compared to a bored and turned joint of metal. Again, if we look at the hinge, in its simplest form; at the articulation of one lever to another; or, more striking than either, at the crank, we find expedients invented by the human imagination to answer distinct ends, which they perfectly fulfil, but of which no prototype or even hint can be pointed out in any natural object.

It is therefore the case that we find, within the province of structural art, certain human inventions that are at the same time absolutely original, and perfect as to the function they are designed to fulfil. In no respect is this more strikingly displayed than in the crank. A movement was attained by Watt, by means of this beautiful invention, without precedent or example. It is a movement regulated by mathematical laws peculiar to itself, of which no idea had been entertained prior to the investigation of this special form of connexion. It is well known that Watt's invention was pirated and patented against the inventor. Watt was then driven to employ a second invention for the purpose of converting reciprocal into circular movement, and he hit upon the equally original, though mechanically inferior arrangement, of the sun and planet wheels. In neither of these novel expedients can it be said that Watt imitated any existing form. Let us suppose that at some unknown distance of time an Egyptian Watt had invented an Egyptian crank, and that the researches o Mariette Bey, or some other famous explorer, should point it out on the sculptured walls of the tombs of Lower Egypt. Such a discovery would take nothing from the credit of Watt as the original inventor. It would only show that it was possible for different minds, by the force of their own inventive powers, to arrive at the same solution of a problem in practical mechanics. If this be the case with reference to an invention so perfectly *sui generis* as the crank, it is obvious that it may be more or less distinctly the case with regard to any form of mechanical ingenuity.

If such be the case, and we fearlessly challenge denial, it follows that we must acknowledge the presence of two distinct original principles which underlie all structural art. We must admit the exercise of the faculty of imitation. We prefer, however, to use the term guidance by experience. The mechanic or the artist who desires to produce a certain result will more readily and surely effect his object when he is fully aware of the methods by which his predecessors have attempted to secure the same ends. To him previous failure and previous success will be equally instructive. Of the former he will seek to avoid the recurrence, by improvements suggested by his own reflective faculties. Of the latter he will reap the full benefit, by a close adherence to the method proved to be true. The mechanic will thus cultivate his imaginative power by the best method. He will waste no labour in overcoming difficulties that have been smoothed from his path by his predecessors. He will imitate what is good in their work,—

not with the mimicry of a monkey, or the mechanical reflexion of a mirror, but with that same kind of mental action which enables us to do on a second or third attempt better than we did on the first. The more perfect his education in this respect—the more thoroughly he is acquainted with all that is wise to imitate, the loftier will be the standpoint from which his own imagination will be able to spring. So far, then, from the action of the artist in structural work being purely imitative, it is essentially and in the highest degree creative. Imitation bears much the same relation to intellectual creation that the grub bears to the butterfly.

It must not be thought that a complete analysis of the different faculties or powers which go to make up the great artist, architect, or engineer, tends to such a division of the subject of education as to prepare one man to design a structure and another to decorate it. It may be said, with some truth, that if there be an essential difference between the imitative and the creative powers or action of the mind, the latter applies chiefly to structures, the former to decoration. To some extent this is the case. With many persons decoration is nothing but imitation. In most cases there is much of direct and unmixed imitation in decorative work. But such is not the case with the highest type of excellence. In that, structure is in itself so perfect as to be self-decorative. We touch here on a point almost too abstruse for full discussion in our columns, and that is, the real essence of physiognomic character of beauty. To say that our ideas of beauty are simply due to association, and derived from some perception or recollection of utility, is grotesque. But this theory is not new. It was happily illustrated by the remark that, on that principle, a man would experience the same degree of pleasure from a glance at a pap-boat as from a glimpse of the bosom of a beautiful woman. To arrive at what we may call the *ratio entis* of beauty, we must use rigorous and exact analysis. It does not follow that we can construct what is beautiful by the reverse process. Still we must resolve a compound idea into its primary elements before we can wisely attempt reproduction. Thus, if we regard the structure of a bird, from that humble water-fowl, the auk, poised on one heavy paw, and unable to fly except under water, to the splendour of the most elaborate ornamental plumage of the peacock or the bird of paradise, we shall be able to some extent to divide structure from decoration anatomically; but we shall not find that structure is complete by itself, and that ornament is afterwards superadded. On the contrary, we find, from the largest bone to the most delicate filament of feathers, constant marks of unity of design. The bone, as exactly proportioned for its mechanical service as if the dimensions had been wrought out by the calculus, is not covered with a purple lustre or a nacreous reflection, because it has to be imbedded in the muscles, and a light-reflecting surface would be a positive inconvenience as regarded the general structure of the animal. But where the skeleton is exposed, as in the beak, or to some extent in the claws, the finish is at the same time mechanically admirable and decoratively elegant. If we take a feather by itself, we have an object of such decorative beauty that woman herself endeavours to heighten her own unrivalled and uncommunicable charms by borrowing the clothing of the bird. We may call such a feather as can be plucked from either of the birds we have named, or from almost every member of the aërial choir, the most ornamental object,—regarded as a simple element,—in nature. But if we look at it with the increased power of vision afforded by the microscope we find that the decorative effect is inseparably connected with perfection of scientific structure. Regarding the purposes for which birds require their exquisite clothing,—the strength to contend with the storm, the lightness which shall allow them to beat the paths of the air, the warmth that shall resist the terrors of winter, the sleekness that shall throw off rain and damp, we find that by no combination conceivable to man can their various purposes be attained so fully as by the structure of a feather. Even the purple glory or golden lustre with which the bird charms his mate, is an incident of the play of light on those minute facets, the excellence of which is desirable for one or another of the objects we have mentioned. Beauty of colouring is, so to speak, an inseparable accident of delicacy of structure; and delicacy of structure is only another name for the avoidance of waste of material. Thus the highest beauty is wedded to the highest utility. No work of the Great Artificer is like a board finished by the plane, and then bedaubed by another hand with a coating of paint. Structure and surface, strength and beauty, design and ornament, go hand-in-hand, or rather bear the same mutual relation as convex and concave. Owing to the limitation of our faculties we must study the two questions apart. But in the forms of nature their existence is absolute. And so it is in all the highest forms of art. The architect or the engineer who first rears his elevation, or builds up his trussed girder, and then proceeds to adorn it, as he thinks, with *appliqué* work, to patch on a useless console or cornice, to paint unmeaning circles or lines, or generally to ornament by incongruous addition, which has not even a conventional relation to structure, will never get far above the level of the detestable.

There is, no doubt, a question how far some of the main architectural forms are, in their origin, imitations of nature. The resemblance between an avenue of noble trees and the intersecting aisles and arcades of a lofty cathedral is one of these instances; that between the graceful spire of a church, and the heaven-pointing peaks which give a special character to the scenery of many parts of Christendom, is another. We feel it to be a question, however, whether the relation between these types is more than apparent. We can certainly trace the origin of the groin, which is the main feature in Gothic structures that most resembles the radiation and intersection of the branches of trees, to its *genesis* in the vault; and if we were called on to point out how the vault passed into the groined roof, we might say that it was in consequence of the adoption of the cruciform plan of building. Vaults are found in Roman and in Romanesque work, which suggest no idea but that of a prolonged arch. We recently gave an account of a theatre or reading-room discovered at Rome, in which the roof appears to have been a vault, partially glazed. In a building of rectangular plan the end of the vault would be hidden by a pediment, or even might appear, as in some of our Jacobean work, with a visibly rounded gable in the façade of the building. The introduction of a cruciform plan, there can be but little doubt, was symbolic. It was adopted as a characteristic of a Christian church, when first erected for the purposes of worship, as distinguished from the appropriation of the basilica to liturgic purposes. The question of dealing with the intersections of the roof directly arose. When vault was allowed to intersect vault, and form a natural groin, it became almost indispensable to give the best materials and the most careful workmanship to the lines of meeting. Thus originated the rib. That this was the case, in rude structures, there can be no doubt. The idea having originated in structural necessity, its decorative beauty soon became apparent. In the vigorous growth which characterised the history of Pointed structure, till it was smothered by the costly splendour of the later Perpendicular decoration, the freemasons and cathedral builders were not so wanting to themselves as to use the rib merely as a decoration. Even if it were not a necessity of structure, it was so handled as to appear to be so. It was by the introduction of various recesses and changes of plan, each perpendicular surface affording a springing for its own portion of vault, that groined intersections became multiplied. The effect was heightened by the multiplication of shafts. In these there is, indeed, a resemblance to vegetable structure; but it cannot be properly called an imitation. It was rather a refinement of true structural design, which, as evidently beautiful, became conventionalised, and wrought out into the most fantastic forms of tracery. We may now be content to copy a doorway from one building and a window from another. If we do so, we imitate,—no doubt of that. We may say that it is impossible to surpass the beauty of work done by the great Gothic artists. Perhaps it is. But none the less that is not only a lower but a generically different kind of work which consists in putting together imitated forms (like composition photographs), however noble in themselves, as compared with the execution of a design in which the artist, while starting from certain fixed requisites of plan, allows his fancy to indulge in quaint and graceful adornments,—as the musician wanders in his melodies around the central idea of some well-known air. It must certainly be admitted that during the healthy growth of the Gothic centuries, origination, not imitation, was the aim of the architect. Had it been otherwise, the history of architecture would have been altogether different. As soon as certain problems had been solved, let us say by the time that the Early English style had attained its zenith, the architect would have been content. A model church would have been taken as a type, and instead of a growth and variety of structural and decorative art which presents, in the course of centuries, somewhat of the same development which the researches of the palæontologist show to have been carried on in the structure of the animal skeleton for thousands of years, we should have had a growth of ecclesiastical and conventual buildings over Europe as like one to another as are trees of the same species in a forest.

It seems, then, to us, that one of the first requisites of healthy growth in the development of art, whether structural or decorative, is to understand the very low place in the mental economy of the artist that is, or rather that ought to be, held by the imitative faculty. Exact imitation, indeed, can rarely be in any way admissible. For decorative purposes, imitation, in order to be admissible, must be scourged and fettered by a certain amount of conventionalism. As to the degree, we do not attempt to lay down a fixed rule. It must depend, in part, upon the object of the detail, but in the main, on the genius of the artist. Thus, let us take such an illustration as that of the introduction of sculptured foliage in architectural decoration. The general opinion is that the leaves and tendrils, and buds, employed, should not be exact copies of nature, but should be so modified in passing under the hand of the sculptor as to show that they are human work, and not petrified branches. As to this there is fair room for difference of opinion, especially as refers to different styles of general finish. But we apprehend that there will be no difference thus far. Absolute simulation is inadmissible. Thus, if we were to take the loveliest tress of ivy, and to produce a *fac simile* of it, colour and all, in gutta percha, it would be no more admissible as an architectural decoration than the wax-work of Madame Tussaud's exhibition can be called sculpture; or if we were to take the actual branch, and to immerse it in the dropping-well at Knaresborough, or in some of the travertine depositing streams of Southern Italy, we should have in a few weeks a real stone branch. Will any one say that this could be inserted in a building of any pretension to architectural merit, otherwise than as a blot and a fault? Thus, we see that, however closely such an artist as Gibbons might copy nature herself, the exigency of the material in which he wrought imposed a certain noble conventionalism on his work. His leaves, his buds, his singing boy-angels are not like waxwork. We can probably find no better example than in such work as that of Gibbons of the true influence of the conventional in art. Absolute imitation is possible, but it is admittedly odious. Imperfect imitation marks the infancy of art. It is highly improbable that the sculptors of the heads of kings and saints, and virgins, which are so grotesquely inhuman in some of our twelfth or thirteenth century work, attempted to conventionalise. They did their best. They came as near to nature as they could,—though they stayed a long way off. Between the rude imitation of the hieroglyphic, on the one hand, and the perfect and accurate imitation of the anatomical modeller, on the other, ranks the work of the true artist. This is at once natural and conventional. Its former quality it owes to the eye and to the hand of the artist; its second to the material in which he wrought, and to his true and instinctive appreciation of the capabilities of that material. The cherubs of Gibbons are not wooden imitations of real children. They are ideal conceptions of lovely children, clothed by the hand of a great master in bodies and robes of wood.

Kensington House.—Rumour says that the large mansion built at Kensington by Mr. Grant is likely to meet with a fate little contemplated at its origin. The building has been some time in the market without obtaining a purchaser. It is said that one of the most wealthy and enterprising metropolitan building firms has made a bid for the house and grounds, which stretch over some seven acres. The intention is to build a square upon the open space, with an entrance from the high road, the house itself to be brought down to more reasonable size by the removal (?) of both the wings.

ON THE PRETENSION OF PHYSIOLOGY TO THE BASIS OF FINE ART.

WE have recently taken occasion to dwell on the analogies which are traceable, and have been insisted on from all time, between the noblest works of Nature and of Art, and this in respect both of the distributions which subserve the convenience of man, and no less of those which appeal to his sense of beauty,—to his appreciation of an æsthetic whole. Surely the architect, if any artist, can sympathise with the admiration which Hamlet expresses in the words, "What a piece of work is man!" though it were but from the simple point of view of construction and combination of parts for the most perfect serviceableness in subordinate, or in the most universally combined, employment and exercise. The reflective prince pursues,—"In form and moving, how express and admirable"; and though movement assuredly is the very last thing welcome in an architectural work, the expressiveness of form, and the variety obtainable from alternate aspects, are qualities that never fail to be sedulously courted and cultivated by every designer of a structure which it is hoped may be worthy of remaining fixed and steadfast for all time.

But it was no experience incident to the following forth of these analogies, that the nature of our æsthetic feelings,—our perceptions, that is, of characteristic expression as Beautiful or Sublime, as Graceful or Impressive, and so forth,—must be doomed to remain a mystery unless we turn off to beg assistance from a physiological elucidation. This, however, and nothing less, is the challenge which those who would meddle with æsthetic study are now called upon to accept, and must do their best to answer, at the peril of all they have hitherto held æsthetically dear. It is averred with no slight confidence, and argued, or rather proclaimed, with no moderate parade of that philosophy which is called positive, that the nature of beauty can only be understood in virtue of accurate familiarity with the anatomy of the organs of sense, and especially with the most recondite details,—at least, with conjectures more or less avowedly such,—as to the forms and functions of the tissues and nerves and peripheral end-organs of the cerebro-spinal system generally. This view of the relation between mental recognitions or experiences and the material instruments of our constitution, has been gradually spreading for some time over the general field of intellectual speculation, and has even made no inconsiderable inroads into those of properly imaginative activity. Readers who are least given to novel reading, and in an ordinary way are unconcerned enough to "keep themselves abreast of the literature of the day" in this form, may easily have been induced to bestow a trial upon a story or two for which claims can be asserted to belong not only to the present but to a far future day; they have been fortunate if even here, amidst all the frantic ardours of romantic passion, they have not found that if subtle analysis of motives and sentiments were to be followed, they must endure the details of the dissecting-room, and not be too much disturbed by an occasional stumble over the long words of the surgeon's *vade-mecum*. Whether physiology may or may not be susceptible of being made poetical we are fortunately not called upon at present to inquire; but, unfortunately, it is not too soon to protest against poetry and poetic fiction being merged in physiology; certainly, to some of the old school,—"to us of the right-hand file,"—this process is distasteful enough; seems nothing less, indeed, than a degradation, and we are disposed to connect with the same sensuous predisposition out of which it seems to be evolved, a tendency for even the most refined of all the passions to be dealt with too caressingly under a physiological aspect, to be presented as if rooting inextricably among animal associations. Novel-readers nowadays may find themselves like the surgical pupils of Sir Astley Cooper, aware of the importance of his injunction, "Your first task, gentlemen, is to conquer your nose."

Again, if we take a long bound from the realms of fiction to what ought to be those of strictest and verified fact, we have presently to note the encroachments of the same self-assertion of physicism, and are confronted by the assurance, on an authority which has many better titles to respect, that "the science of morals is based on that of biology." We rub our eyes and ask ourselves what science, if not that of morals, was it which we have been in the habit of regarding and venerating as moral science, of which the teachers have attached the respect, and earned the gratitude and acknowledgments, of the best of our predecessors, generation after generation, long, long before our author would admit that the science named biology was studied in any form that he would recognise as biology, even in its rudiments. Far from us and from our friends be the conclusion that no verifiable theory of duty, not to say a sense of conscientious responsibility, can consist apart from knowledge, more or less certified, of "the laws of transmission and development of vegetative and animal life." Turn we to another of the "lights of the world and demigods of fame," and him we find credited, as with a discovery beyond price, with the announcement, that the training of the young, which by nature and necessity is in the charge of mothers and aunts, has hitherto all gone wrong, and that remedy is only to be expected from these earliest educators being thoroughly grounded in psychological and physiological science. There are some sections of moral science which philosophers who are bachelors,—if bachelors,—will be wise to let alone; the wisdom of such, when regardless of this caution, will be but foolishness in comparison with the practical faculty of those whom they despise. The wisest physician is the readiest to rebuke a prater about "the science of medicine"; and trusts for present success to traditional instruction combined with the experience which he has stored for himself at many a bedside; the profoundest psychologist will smile at his own deficiencies when he sees a child-nature which he is utterly unable to influence for good, become, under the influence of one who perhaps never heard of psychology, gradually susceptible of gratitude, amenable to discipline and reason, and capable of sustained attention and unswerving resolve. How far a course of recondite physiology would promote accomplishments which have so] supreme a function, may be investigated along with the desirableness of commencing a course of architectural drawing, with an anatomical demonstration of the nerves and muscles of the hand.

With all proper respect for physiology and physiologists, and for conscientious studies from the so-called positive point of view, be the conviction declared as that of students equally entitled to attention, and quite as likely in the long run to secure it, that sentiment and morals,—that whatever is most valuable in ethics and in æsthetics, and even in the drier theory of logical discourse, may be fairly mastered without incurring the slightest obligations to either scalpel or microscope. The obligation, in fact, lies clearly the other way, if mental philosophy thought the claim worth pressing. "The subject matter of our investigation," says the author of a recent work on a subject portentously designated Physiological æsthetics, "will be the feelings aroused in man by the beautiful in nature, and in the arts of architecture, painting, sculpture, music, and poetry." "The main principles upon which is to be based the proposed system of æsthetics, are chiefly these" and the like, "as briefly recapitulated." "The human organism—a highly complex machine,—differs," he observes, "from machines of human construction in possessing the mysterious attribute of consciousness. This consciousness is specially connected with and definitely related to a certain portion of the organism known as the cerebro-spinal nervous system, or rather with particular members of that system; every state of consciousness is a reflex or outcome of their physical states. The various sense-impressions are the reflex or outcome of their states viewed from the aspect of the various portions differentially affected." This, perhaps, of this will be enough. With some indulgence it may probably be understood to mean that we receive different sensations according to the particular organ of sense which happens to be affected; and that the effect which we experience has a definite relation to the kind and degree of the exciting cause thereof; only that there needs no philosopher rise from his retirement to tell us that. If he will tell us what changes in the organs he can attach as positively as befits a positive philosopher, to certain experiences in the way of sensation, there are may who will listen to him and justly value his communication; but even so he would not be entitled to call his knowledge physiological æsthetics,—more plausibly, it may be æsthethical physiology,—though even this would carry vain pretence to the verge of presumption and audacity.

Physiology, we are told by an authority well accepted, embraces the properties and functions of the tissues and organs,—the primary conditions of growth and development; and further, that as mental phenomena when observed in others,—although interpretable by our consciousness of what is passing in ourselves,—can only be objective phenomena of the vital organism; therefore an acquaintance with the general principles of structure and function is indispensable for the psychologist. We can but say, in Falstaff's words to the Chief Justice,—"We would your worship would take us with you."

Doubtless our cognisance of even the existence of other minds, not to say of the thoughts and feelings which occupy them, is due to our observation and interpretation of certain bodily and material manifestations,—"objective phenomena of the vital organism," if so please you;—but even for this no scientific knowledge of tissues and organs is requisite; and after the best of such knowledge is provided we have still to fall back, as is admitted, on psychological interpretation from our own experience,—experience which it is certain, though not admitted, because this is a matter quite overlooked, is in all the most important points independent of our consciousness of the properties, functions, and even existence of the cerebro-spinal nervous system at all. To speak of the expression of mental states as "only consisting of objective phenomena of vital organism," is as reasonable as to define the Venus of Melos as only a mass of carbonate of lime, and to demand from an expositor of its expression to begin with a chemical analysis. It is not in these columns that the designers of the Majestic and the Beautiful will be discouraged from giving attention to the properties and conditions of treatment and duration of either carbonate of lime or any other rock, whether crystalline or stratified; quite as little will they on their part be misled by this useful study to sympathise with the conviction "that in every æsthetic feeling, intellectual and complex, emotional factors are only contained incidentally; and that their ultimate,—nay their principal,—components, ideal or actual, are pleasures of sense, either tastes, smells, touches, sounds, forms, or colours."

That we have sensations before we have ideas of sensations,—pleasures of the senses earlier than pleasures of intellectual or imaginative excitements,—does not prove that these excitements are otherwise than susceptible naturally of greater delightfulness than any sensations whatever. Sensations are doubtless constantly the occasions of reviving and stimulating our liveliest currents of ideas, but our memories, reflections, imaginations, associations generally, have a value out of all proportion to the immediate stimulation of peripheral end-organs,—much more to the mere secondary reference to such enjoyment. To invert this scale of relative appreciation is to set the hodman above the mason, and the mason above the architect. Handel by this scheme is not supreme over, but the servant of, his organist; and the blower of the bellows is lord of all. Can it be that we are seriously called on to admit that dignity and grace are not essentially,—are not in origin, development, and culmination, indefeasibly attached to moral characteristics,—that they "only incidentally" involve an appeal to our sympathies with moral qualities and intellectual powers, but rest above all on reviving or promoting reminiscences of material impressions affecting organs of sensation? Have we then, indeed, to unlearn for a new æsthetic revelation the time-honoured doctrine that as moral culture advances with the refined appreciation of moral distinctions, an advance which is compatible with a very simple state of life and manners, so all that we prize as style in all the arts is due to a parallel and sympathetic progress? Is it a fact, which either experience or philosophy can substantiate, that æsthetics, and ethics, too, either speculative or practical, invariably and of necessity keep even step along a line which is measurable by the stages of our knowledge respecting afferent and efferent nerves, grey matter and protoplasm, and dependent on the delicacy of the experiences of the senses,—of the peripheral end-organs? What, in that case, must not be the perfection of physiology at once and of sensuous enjoyment, with which we have to credit the century that was ennobled by the conception of the spire of Salisbury,—by the admiration which secured the adoption of so daring a design, by the skill and resolution that effected its completion? Nay, sentiments surely were marvellously in advance of sensations, and not merely ancillary to them,

in the mind of that unnamed, unknown genius, of doubtful religion and disputed race an epoch, who governed the erection on Salisbury Plain of that other structure which, by most truly artistic gradation, leads us on through subordinated arrangements and magnitudes from enclosing and interlocked circle to larger and largest trilithons, and leads us upward to conceptions among which mere sensation is forgotten. In this master-work of all unhewn stone architecture,—a work to which, in respect of technical processes, the Cyclopean walls and Lion sculptures of Mycenæ are elaborately artificial,—the feelings are still addressed, and must have been originally recognised, which it has been the triumph of architecture in all the greatest ages of the world to excite and satisfy. This is no effect of the mere glamour of rudeness and ruin; but awe and admiration grow the longer we linger on the spot, and the more completely and definitely we recover the imagination of the original scenery and scheme. It is not by anatomy of the organs of sense,—it is by scrutiny of the most familiar laws of association,—of the manifestations that are at once noblest and most commonplace, the sentiments experienced by all mankind, that we must seek the clue to the suggestion of such a work, and the explanation of its effects upon ourselves.

Before physiology lays claim to æsthetics and ethics as its secondary development and subordinate provinces, it would be well that its professors should give proof of caution in their first and preliminary expositions while they are still within the limits of their own unquestioned territory. More than once we have had occasion to remark what we may find occasion to set forth in detail hereafter,—that the scientific treatment of architectural proportion is best approached through a well-understood study of that of music. The two theories diverge widely enough after a time, but up to a certain point,—a point which it is of the highest interest and of critical importance to determine,—the elements of harmony are the same for both. What will be the fate of architecture when this new school of æsthetic physiologists,—of positive philosophers,—finds time to fasten upon it, may be shrewdly forecast from what is now put forward as the solution of "the whole difficulty of harmony and discord."

With a word or two on this matter,—a warning by no means premature,—we will conclude. The difficulty itself is said to be to explain why it is that musical notes of which the vibrations do not stand to each other in numerical relations of frequency, should produce unpleasant sensations. This seems much like making a mystery of the unpleasantness of walking arm in arm with a friend who is always changing step,—of enduring the unconcerted trot of a horse with one leg lame,—of running up a flight of stairs with entirely irregular risers. However, what of the explanation? The explanation is an inference assumed by its positive expression to be a certainty, upon the warranty of a discovery which is all the while admitted to be problematical. Fallacy, in this form of illicit substitution, not unfrequently insinuates itself among our reasonings, but not usually with so little care in the adjustment of her mask as is evinced in enunciations like the following:—"In the human ear, it is told to us, Helmholtz has shown, with great probability, that Corti's organs in the cochlea are a series of elastic bodies, each with a different natural period, arranged in similar order so as to be severally excited by recurring undulations having different periods of vibration. Each of these organs is connected with a certain number of separate nerve-fibres. When the various stimulations *thus excited* are communicated to the auditory centre, they *are* there cognised as differences in pitch," &c. For consistency we should read,—"If so excited, and if so communicated, they possibly may be," &c. (Physiological Æsthetics, by Grant Allen, p. 108). As frank a confusion will be found, p. 106, where the "apparently" of one sentence appears in the next, as if by natural evolution, as an absolute assertion. Apparently, then, to express our own view with careful guardedness,—apparently and with great probability, we may congratulate the æsthetics of architecture on having been let alone, in some degree, by the physiologists so far, and trust devoutly to be let off as mercifully in future.

The Society of Arts' Conversazione took place at South Kensington Museum on the 27th of June, and passed off agreeably enough.

"PAINTERS' ARCHITECTURE."

UNTIL very recently, we suspect, painters' architecture has been regarded by professional architects with a feeling not entirely flattering to the less exact art, and in the present day of brotherly love and respectable tolerance, architects and painters have, we fear, been known to disagree. Even now, the painter's opinion on the beauty of the shop-front or the design of a cathedral is, we believe, as little regarded as, perhaps less than, the crossing-sweeper's estimate of his ability to raise the level of Piccadilly would be considered by one of our biggest contractors.

We remember many years ago, on walking through the Borghese gardens with a distinguished architect whose artistic fame comfortably reposed on having designed the Gothic stabling for a well-known royal palace not a hundred miles from London. On our admiring the picturesque outline of the so-called "Raffaelle's Villa," which then existed, overshadowed by the two beautiful stone-pines, "Ah!" remarked our friend, "*Painters' Architecture*," and we picked up the expression and reverently adopted it, and we regret to say we have ever since, in using the expression, found it difficult to avoid a slight intonation of contempt.

But how is it that painters' architecture never offends one, but, on the contrary, is invariably charming, as we find it represented in the illuminated missals of the earliest times down to the seventeenth century, and who can be so rash as to quarrel with the architecture in Paul Veronese's magnificent picture, the "Marriage of Cana"? He at least must have been at perfect accord with the architectural friend who helped him in his great undertaking.

After a careful inspection of the architectural designs at the *Salon* of this year, regarding them from a painter's point of view, we have nothing to complain of on pictorial grounds; but, as architectural creations, they simply seem hideous fallacies.

There appears on the part of all French and of all Continental architects just now an emulative desire to approach the overdone manner of M. Garnier's showy new Opera-house, which, by the way, gains little now that we are able to see it from the further end of the new Avenue de l'Opéra, at which distance we are still able to detect the coarseness of its details.

Painter-sculptors are just now showing an ability which sculptors are quite ready to recognise, and sculpture and architecture seem to have been so combined in the graceful minds of Jean Goujon and Jean Cousin of the sixteenth century that if it were not for the requisite bas-reliefs of the former, and the magnificent tomb of Admiral Chabot by the latter, it would be difficult to determine the exact position of these artists.

Had the municipality of Perugia, when they proposed to decorate their *Cambio* in the fifteenth century, allowed their time to be wasted by the uncertain views of critics, and the disputes of painters and architects, we should not have had, in the present day, that perfect specimen of a decorated apartment to guide us for the future.

Such drawings as M. Bruneau's "Château de Coucy," exhibited in this year's *Salon*, in which he represents with great exactness the actual state of that interesting specimen of a Gothic fortress, and which fully realises the painter's love of picturesque Mediævalism; or M. Darcy's restoration of the Hôtel de Ville of Dreux; leave us nothing to desire in the way of accuracy and perfection of manipulative excellence, of drawing or local colour. Indeed, whenever the teaching of that admirable artist, M. Viollet-le-Duc, has been carefully regarded, as in these drawings, the result is invariably satisfactory.

Many a Lancashire idler in France, this summer, as he extends his wanderings into the pleasant valley of the Department of the Seine-Inférieure, and probably looks covetously at the copious stream that waters it, will scarcely fail to gather a hint for his contemplated "big house" at home when he sees the magnificent piece of ancient brickwork, the Château d'Auffay, which M. Reboul proposes so skilfully to restore.

The admirable manner in which French architects represent the actual state of the building they may be about to restore, and the delicate way in which they mark the proposed additions, cannot too carefully be studied, and such drawings as we have named already, and all those executed for the archives and the publications of the Commission of Historic Monuments, will show for centuries to the cavillers in the much-vexed question of restoration how far the work has been mischievous or useful.

In 1830 the French Chambers, recognising that the restoration of the historic monuments of France was a subject of public interest, a commission was formed for the purpose, and as a first instalment the sum of 80,000 francs (3,200*l.*) was voted. M. Vitet was named director, and in 1833 was succeeded by M. Merrimée, who, during his twenty years of office, supplied in a series of reports information so valuable that the real interest of the question was thoroughly appreciated, and recently the sum voted for the restoration of the historic monuments of France was 1,360,000 francs (something more than 50,000*l.*). The smallness of this vote greatly restricts the field of operations, but, in addition to minor works of reparation, the Commission consecrates each year a considerable portion of its income to the restoration of some monument or monuments of importance. Each project has to be supported by photographs which exactly represent the actual state of the building, and permit the Commission to pronounce, after careful examination, its approval or the contrary of the restoration proposed. Might not this plan, if adopted in England, greatly simplify the much-vexed question of restoration? As may be easily understood, one of the most important services rendered by the Commission has been that it has assured the education of artists capable of restoring the old edifices of France. Each year among the architectural works exhibited at the *Salon*, the Commission chooses those works which denote the most serious study. The artists are then given some small piece of restoration to carry out, and according to their abilities are employed on more important works. It may be observed as a sensible proviso that each of these architects is more especially charged with works concerning the monuments of the same region, he being most likely thoroughly to understand them.

A continuous watch is exercised over all works in course of execution by the inspectors-general or the Commission, who visit the spot, and are called upon to give reports. This inspection is further completed by a controller charged with the verification of the accounts presented by the architects. Such is in its essential points the organisation of the service of the Historic Monuments of France,* and if such a system were carried out in England, it would hardly be in the power of Mr. Ruskin and others to speak of "accursed architects' jobbery."

There may be recondite or there may be very simple reasons why painters' ideas of architecture are but little regarded by architectural professors; but surely architects as artists must admit that fine art consists in transferring under a beautiful form the impressions received by the brain of the artist, and practically expressing satisfactorily his happy thoughts. The material way in which the impressions are treated matters little: the man who thinks and works will make use indifferently of pens and paper, brushes, the modelling tool, or the pencil and T-ruler; a beautiful symphony is at least as great a work of art as a beautiful statue, and a great work in prose or verse is even more enduring than a great picture. Dante, Michelangelo, Brunelleschi, and Mozart must be content with the equality of their fame; their great thoughts have made mankind better and more thoughtful, and in the present day, when we have all so much to make us happy and contented, do not let painters and architects, whose duty it is to surround us with substantial well-decorated dwelling-places differ as to which is the better able to info[illegible] already instructed.

Co-operative Church Decoration.—According to the *Sherborne Journal*, a new development of the co-operative principle is projected in connexion with Church decoration. Some clergymen, it is said, are trying to form an association under Episcopal patronage for undertaking ecclesiastical decorative work, at what is called trade price. All members of this society would obtain church furniture and stained windows at a fraction above cost price; and if the scheme prove successful it will be extended to the building of churches and schools.

* The Commission possesses a collection of some 7,000 drawings, 3,000 engravings, 4,500 photographs, and 1,200 ancient and modern architectural works, a catalogue of which is at the disposal of any person who may wish to refer to the document, at the Office of the Monuments Historiques, 3, Rue de Valois, Paris. A valuable architectural map of France has also been published.

THE HANDEL FESTIVAL ARCHITECTURALLY CONSIDERED.

THE occurrence of a musical performance on so great a scale as that of last week can hardly pass without suggesting one or two points in reference to the practical connexion which architecture has with such great celebrations, in regard both to effect and to convenience of hearing: points which are certainly not here considered in these columns for the first time, but which are among the things which it is necessary continually to bring forward anew from time to time to gain any attention to them at all.

Perhaps nothing would have more struck a visitor from another country, who had neither heard the Handel Festival nor seen the Sydenham Palace before, than the apparently strangely accidental nature of the area in which the performance was given, and its want of relation to the purpose of the gathering. Nothing about the place seems to be planned for the purpose, save only the large tier of seats arranged theatre-wise for the performers, and the concave ceiling over them for throwing forward and confining the sound. The orchestra is crossed and intersected by iron columns and girders, and the area on which the audience are seated is not defined acoustically in any way, but merely arbitrarily marked off by a temporary barrier; it extends considerably to right and left into the nave, which is perfectly open, and in some places under galleries which greatly confine and smother the sound.

In fact, like a good many good things in art, the Handel Festival sprang up in a somewhat accidental manner, and the Sydenham building alone afforded space for it, and was utilised accordingly; and, considering the nature of the structure, and that nothing in its plan or construction was originally designed in reference to such a purpose, one may be surprised to find the result so satisfactory as it is; and perhaps it may be a question whether, for a celebration which takes place only once in three years, it would be worth while to attempt any more thorough and permanent provision in the way of orchestra and auditorium. On the other hand, there is also the suggestion which arises, whether such colossal performances might take place oftener, or at all events be regarded sufficiently as an established form of National festival to make the provision of some permanent building,—once for all,—an idea worth carrying out. And the consideration as to what results should be aimed at in such a building, in the light of the experience of the recent festival, may not be thrown away, if only as matter for suggestion in regard to buildings erected for music.

Architecturally speaking, it is, of course, easy to imagine the effect of the Handel Festival, to the eye, improved. The intrusion of the constructive supports of the building upon the orchestra space, already alluded to, is unsightly to a degree, and conveys at the same time the impression that it must be interfering with the effect more or less. But this is a matter which only a reconstruction of that portion of the building could obviate. The design of the great organ, again, is exceedingly poor, and has the serious defect that it does not give the real scale of the place, but rather lessens it than otherwise. Every person unaccustomed to the place is surprised to hear what is the real size of the organ, and the fact that the orchestra never looks its size is mainly due to the clumsy design of the organ-case. A new case, of better and less commonplace design, is by no means an impossibility, without disturbing any essential part of the structure, though, of course, it would cost something appreciable. Even a different scheme of colour (if there can be said to be any such thing as a scheme of colour in it now) would effect a material improvement. There are other things more easily improved. It would be satisfactory to see some less commonplace ornament round the margin of the orchestra arch than the coarse painting of musical instruments and other devices in panels of blue and buff, and something more of a decorative effect in the great coved ceiling formed by the sound-board over the orchestra. It might be possible, without very much consideration or cost, to contrive a rather more effective ingress for the audience to the area than letting them find their way in at an odd corner, as if they were going where they had no right to go, and wanted to get in unobserved. A wider entrance, and something like a temporary decorative archway to pass under, would make all the difference in the world in the appearance of things. Beyond that, it would not perhaps be easy to do very much; except that the painful ornamental features in front of the opera-theatre, which forms the back of the Handel audience area, might at a convenient season be ameliorated. If a building were ever to be erected for the purpose, its architectural treatment would, of course, be a thing to be considered *de novo*, and in relation to site and other particulars.

But the arrangement of a great music-hall in regard to acoustical effect is a subject we may get some hints upon from the Handel Festival performances. The disappointment felt by many on first hearing the choruses at the Handel festivals is, that the effect does not seem by any means commensurate with the means employed, when we compare the numbers with those of an ordinary chorus. There are reasons for this apart from any consideration of the nature of the building, partly arising from the fact that the *timbre* and travelling power of the individual voices is unchanged, and the velocity of sound is a "constant" also, while the area to be filled is greatly increased; and, in consequence, the several "parts" do not strike the ear with that sharpness and precision which is felt with a smaller number in a smaller place, but seem by comparison muffled and confused. This is, and always will be, the case when we get to concert-rooms above a certain size; and, as a general rule, the building of very large rooms for music should be discouraged, as it is certain to lead to a good deal of disappointment, though it may be worth doing for certain special purposes. But so far as the shape and make of the building influences the effect, we find that observations of the effect at different parts of the Crystal Palace during the late festival are significant in confirming views which have been previously stated in these pages and elsewhere. The great difficulty at the Crystal Palace is in confining the sound to where it is wanted. The material of the building is completely against it, in the first place. Glass is not a reflector of sound to any great extent, nor does it, like wood, vibrate in sympathy with musical sounds, so as in any way to assist them. It was said, we remember, that at the first festival the Hallelujah chorus was heard half a mile from the building. All this, of course, is sound lost to the audience; and the conviction of this loss of sound led to the construction, after the first Festival, of the arched top or sound-board over the orchestra, which we have not a doubt has greatly improved the effect: not having been present at the first Festival we cannot make a direct comparison. At the last Festival, we remember that the openings into the long nave, on either side of the transept, were filled with a great canvas screen suspended from the roof, with the view of shutting in the sound more; this was not done on the present occasion, and perhaps the omission was right, for the fact is well known that all things of the nature of stuffs absorb sound, and it is very possible that the canvas screens swallowed more sound than they reflected. But it was remarkable how the sound got about the building, nevertheless. Standing in the end of the Egyptian colonnade while a chorus was being sung, we heard a well-known phrase for the high notes of the basses almost as loud, as it seemed, as we could have heard it in front, though the singers were not only shut out from view, but singing away from our position and towards another quarter of the compass. This, again, shows how much of the effect of the mass of voices escapes those who (to put it in a commercial way) have paid high for the said effect, but cannot have it all to themselves; and this is why, also, the Palace is thronged on the Festival days with crowds who do not purchase seats in the reserved area, but who have given sufficient practical attention to the matter to know that there are many parts of the building adjacent to the reserved area where they can hear just as well as a large number of those who have paid their guineas for seats within the barriers. On the other hand, while the sound thus finds its way about the open spaces of the building, far beyond the limits of the Concert-room, we have it on the testimony of some of those who sat within the area, but in the portion under the galleries, that here the effect was very much lost and confused; which was to be expected, in fact. In such a case, just as the floor overhead shuts out light and makes a gloom beneath, so it shuts out sound,—all the reflections of sounds which do not travel straight towards the low opening,—and produces "sound shadows"; for it may be taken as a general rule that whatever shuts out sight shuts out sound also. But the most marked result from our observation at the Handel Festival is as to the superiority of a raised position for hearing. In the second gallery, high above the orchestra, the effect of the chorus was tremendous in some instances, and in all cases there was an impression that everything reached the ear,—that one heard all that was to be heard. Sitting below, in one of the blocks in the level part of the area, the effect was weakened by one-half; it was quite feeble in comparison. The contrast was even more striking with the solos. These were perfectly well heard in the gallery, and that not merely in the front portion, which is comparatively near to the orchestra. From the cross-gallery, running behind the top of the opera-theatre, Mr. Santley could be heard quite clearly and effectively in "The trumpet shall sound," in the "Messiah"; whereas, from the level seats in block KK, some 50 ft. nearer to the orchestra, the same singer's voice sounded comparatively ineffective. But what is still more noticeable is that a change from the level seats to one of the raised seats in the rear of the area, only two or three steps higher than the floor-level, made quite a remarkable and disproportionate difference in the effect, which was at once greatly strengthened, and everything rendered clearer and more telling. These results must surely have been experienced and noted before, and yet people will go on building music-rooms with flat floors, deliberate contrivances for preventing audiences from hearing what they are intended and supposed to hear. The experience of observations from various parts of the building at the Handel Festival really ought to convince the architects of music-rooms that they are not on the right track in this respect.

If it should ever come to pass that a building should be erected purposely for such great festivals as these, it may be suggested that timber might well play a large part in its construction. There is no doubt that, with all the grandeur of the Handel Festival chorus even under existing circumstances, it is heard to great disadvantage, not only from the escape of sound, but from the unsympathetic nature of a glass and iron construction in regard to musical sound. The great advantage of timber in this respect is that it sympathises with and reinforces sound without sharply reflecting it. Apart from general observation on this head, we have (as was pointed out in a paper on the subject of buildings for music read at the Institute of Architects a few years ago) some special testimony on record in regard to the effect of timber constructions as musical. It was the testimony of the late Mr. Chorley that no building could well have been more satisfactory in its acoustic effects than the temporary *Fest-Halle* erected at Bonn for the Beethoven Festival, and made (under the superintendence of Zwirner, the architect at Cologne Cathedral) entirely of timber, with rough fir poles for columns. It was the testimony of General Scott, quoted in the same paper, that the resonance at the Albert Hall was never more perfect than when it was filled with a forest of scaffolding. As it is, the Albert Hall is a remarkably good building, acoustically, for its size; and that it is so is due to the wooden lining, which provides what we want in such a case,—resonance without echo, which cannot be obtained so well by any other material. Here, again, the experience of the Albert Hall confirms what the Crystal Palace forces upon our notice,—the bad effect of glass and iron musically; for the glass dome of the hall has been the great difficulty with it acoustically, until the *velarium* was introduced; and that is not a really satisfactory way out of the difficulty, as it not only destroys echo, but at the same time absorbs sound to a greater extent than is desirable. Still, the Albert Hall is, on the whole, a great success acoustically, and it is so owing to the right materials being used for the most part, and not by any means owing to its elliptical shape, which has, in reality, only a tendency to focus an echo, and which, as a matter of planning, is completely wrong, and an unfortunate instance of the adherence to precedent; the form of the Roman amphitheatre, an essentially spectacular form, having been, by the oddest system of reasoning, adopted for what was essentially intended as an auditorium; and it is only this fact, and the defective size and arrangement of the orchestra, which interferes with the complete success of the Hall as a place for a large musical entertainment.

What is required in such a case is to concentrate the sound in one direction; to get rid of

return echo without losing resonance; and to reduce to a comparatively small proportion the amount of vacant air-space in which sound will get dispersed and lost. If, following out this idea, we were to take the Handel Orchestra at Sydenham as it stands, as a starting-point, and in front of it place a properly closed-in area of the same width, rising with a regular curve from front to back, and with the back wall so contrived as to break up and disperse and return echo, it seems not unlikely that we might extend the area lengthways from the orchestra to nearly double its present dimensions, and yet enable those at the back to hear the choruses satisfactorily. At the Crystal Palace a great part of the sound is not driven forward at all, but escapes at each side into the nave, as well as permeating the glass roofs and walls. Confine it properly in one direction, and build with resonant material, and it might be heard by even a larger audience than now hear it, and with more satisfactory effect. There would be, for those at the extreme end of the room, an appreciable interval of time between the striking of the chord at the orchestra and the hearing of it at the other end, but this would be the same for all the instruments and voices, and each auditor would hear all the sounds simultaneously, though those at the back of the room would have them a trifle later than those in front.

A point worth notice, in regard to the effect of music in great areas, is that heavy percussion instruments, such as drums of all descriptions, tell very greatly in proportion to the other instruments and to voices. This was noticed in the *Builder* some time since, in some remarks on the musical performances in the Albert Hall on the occasion of the opening of the International Exhibition of 1871 (see *Builder* of May 6, 1871), and the experience of the Handel Festival confirms it. The abnormally large kettle-drums made (I suppose) for the occasion, and which caused the members of the chorus who were near them to put their hands to their ears, were really an overdose of "percussion," and seemed to dominate over every other sound, and might very well have been used with more of Christian moderation. This is perhaps a musical rather than an architectural point; but it is not unimportant, in reference to the objects of a building, to note what kind of sounds are most felt in a large area: and there can be little question that sounds in themselves harsh and violent tell proportionally more, in a large space, than those of a quieter and more sustained character.

H. H. STATHAM.

THE HOUSEHOLD AT DIFFERENT ERAS.*

THE "GREAT MOGULS."

Sir Thomas Roe said:—"One thing is remarkable in this Akbar Shah. When it was told at the Court that the Portuguese had hanged the Korán about an ass's neck, and so whipped him through the streets of Ormus in contempt of the Muhammadans; and the old Empress, his mother, came in great rage, and demanded of him that our Bible might be treated in like manner at Agra, the Prince replied, 'No; though the Portuguese had done very ill, yet religion must not suffer for their crime; and the Bible, being an innocent book, was not to be disgraced because the Korán had been so.'"

Embassy from James I. to Jahánghir, A.D. 1616-18.

ALTHOUGH the Crusaders brought home to Western Europe stories of wonderful lands situated far beyond the Holy Sepulchre, and although in 1322 Sir John Mandevil added to the chronicle of his travels fables about India current along the coasts of Syria and Arabia, trustworthy European descriptions of the peninsula, made from actual visits to its shores and interior, date only from the latter half of the sixteenth century. When, in December, 1576, John Huighen van Linschoten sailed for the Portuguese Indies,—so they were called in his time to distinguish them from the West or Spanish Indies,—the English people were hotly divided upon the great question of a national religion: Queen Mary had done her part to settle it in one fashion; Queen Elizabeth was doing her part to settle it in another. The Emperor Akbar, absolute master of Hindústán, from Lahore downwards to the mouths of the Indus and the Ganges, inculcated religious toleration among millions of different race and language, of hostile creeds, of various sects and castes who obeyed him. The spectacle of such power astonished those who penetrated to the Court of the Great Mogul; and the journals they carried home, the accounts which from many sources reached this country during the closing years of Elizabeth's life, and the beginning of the seventeenth century, justified Milton's extravagant allusion to "the wealth of Ormus or of Ind." Linschoten's "Voyages," printed in London in 1598, had already furnished Shakspeare with a humorous simile, for in "Twelfth Night," Maria, telling of her own tricks and Malvolio's wrinkles, says:—"He does smile his face into more lines than are in the new map with the augmentation of the Indies,"—the maps of the time being positive cobwebs of geography.

But before the death of Elizabeth very few Englishmen had passed along the route from Surat to Agra. The capital of the Portuguese Indies was Goa. Linschoten's account of it, about the year 1576, is as amusing as it is graphic and minute; and his evident astonishment at the Portuguese, the half-caste families of note, and the native "Christians," both wife and slave, who "keepe worshipfull and bountifull houses,"—who, when they go in the streets, "steppe very softly and slowly forwards with a great pride and vaineglorious majestie,"—is exactly the sort of description likely to have stirred the curiosity of our ancestors. Notes of travels in India, made a little time afterwards by people of different countries, have been preserved and collected.* One Thomas Stevens sailed thither from Lisbon in 1579, and in the next year one John Newberry started for India. In 1585 the latter left a party of Englishmen at Fatahpúr to go to Lahore; among them was "Mr. Leeds, the jeweller, being entered into the service of the Great Mogul, who gave him a house, horse, slaves, and, besides, a good salary." George Raymond and James Lancaster went to "divers parts of the East Indies" about the year 1591; and five years after, the Great Mogul,—the Emperor Akbar,—sent to Goa for the famous Jesuit, Xavierius, who spoke the Persian and the Hindústáni tongues, on purpose to argue the doctrines of the Christian religion with the Muhammadan priests. He is said to have accomplished his part "like a Christian, and to the honour of the author of his religion."† The presence of a colony of Jesuits at Agra, where it still flourishes, was inimical to the success of a political mission from this country to the court of Akbar. One John Mildenhall, an informal ambassador, reached Lahore in 1603, and proceeded thence to Agra, for the purpose of obtaining the Emperor's consent to the English attacking the Spanish in Indian waters. Of course, the Portuguese priests opposed the envoy, and not until after six months' study, when the latter could talk to the Emperor without the aid of an interpreter, was that consent obtained. In 1615 the English who resided in Surat were under the protection of Jahánghir, Akbar's son and successor. In October, 1616, Master Thomas Coriat wrote to his mother from Agra, where he had been staying some fourteen months, during which time, to use his own words, "I abode in the house of the English merchants, my deare countrymen, not spending one little peece of money, either for diet, washing, lodging, or any other thing." In December of the previous year, Sir Thomas Roe's embassy started, bearing a letter from King James, which refers to articles concluded by one Captain Thomas Best. The Emperor Jabánghir's answer, permitting Englishmen to carry on trade within his dominions, terminates with the assurance that "if any in my country, not fearing God nor obeying their king, or any other, void of religion, should endeavour to break this league of friendship, I would send my son, a soldier approved in the wars, to cut him off." A few years before, one Captain Hawkins had been entertained by the said Emperor; and Mr. Salbank, who, in 1609, went from Surat to Agra, described Fatahpúr-Sikri‡ to be "every whit as big as London." Near that time, William Finch, a merchant, took the same road, and continued his journey to Delhi and Lahore. John Albert de Mandelslo followed a similar route, about 1638, during the reign of Sháh Jahán, the soldier approved in the wars before mentioned; and Bernier, the wandering French physician, who wrote his account of Agra and Delhi at the latter capital in 1663, has left a vivid picture of the Court of Aurangzib in a book which, in 1672, was very badly "Englished out of French."

Bábar, the founder of the Mogul dynasty,—in what is assumed to be an autobiography, but which contains only a fragmentary portion of his life,—describes the country he has invaded and conquered as very extensive, rich, and populous, but extremely ugly. At Agra, but where or on which side of the river it is difficult to say, he wished to build a city; he "began by making tanks, and wells, and a Hall of audience, and went on in the Indian manner without any plan." He had previously lamented, much as Englishmen lamented some 300 years after, the impossibility of finding good musk melons; "the Hindús," he says, had neither "ice, baths, colleges, candles, torches, nor even a candlestick." This last household utensil was supplied by men who held in the left hand a tripod containing a wick, and in the right hand a gourd containing oil, with which the wick was moistened as it burnt away. But in compensation there were innumerable workmen of every trade. He obtained hundreds of stonecutters, to use the Oriental method of indicating large numbers,* in Agra alone. His private house, or Hall, or, more correctly, his stone tents, being finished, he built a bath, doubtless below the level of the soil. It was an edifice paved and roofed with red stone, within which it was possible to escape the three torments he enumerates of Hindústán,—the heat, the wind, and the dust. In the garden he made around it, the rose and the narcissus were planted. Others followed his example or his commands; and "on that side of the river" there were soon so many gardens—quite novelties to the Hindús—and watercourses that "the men of Hind gave the name of Cabul to the place in which they were situated." The Agra of Bábar, we suspect, was on the eastern bank of the Jumna; that of Akbar—the Agra of the present day—being on the western bank. It was, however, a city of some consequence. When Bábar went to a banquet at the house of Sultan Muhammad Bakshi, on the 13th of November, 1528, the streets were spread with rich carpets. A little more than two years after this event he died.

His description of a Hindú town tallies with what may still be seen in the large villages, and over the major portion of the native towns, at the present day. It was built very quickly, and the destruction was often equally rapid; the houses consisted of reeds, bamboo canes, and sometimes timber. "On the approach of an enemy," he explains, "the inhabitants bury their more cumbrous effects, and, each taking a burthen of grain, they retire into some fort or natural stronghold." The early Muhammadan cities were not much better or stronger. The nomadic character of the Mogul conquerors prevented the development of the cities they founded. Of Bábar's "palaces" not a trace remains. The Palace of Akbar, at Fatahpúr-Sikri, is really a camp in stone. Jahánghir delighted in what Sir Thomas Roe called a "Movable Court." The founding of a new city to which the Great Moguls, one after another, aspired, was merely the planting of the Imperial residence in the open country, or on a plain, at a short distance from an old city. It was quickly surrounded by the houses of the Emperor's immediate dependents, by the huts of camp followers and others, who were permitted to squat at a proper distance wherever they found it convenient or possible. What one man could accomplish in India by the force of absolute will and the wealth of plunder, at a time when law was the appanage of the strong, may be not inaptly illustrated by actual occurrences, under a refined system of government, by the power of economy, and at a time when property is secure.

Such a digression cannot fail to be profitable in any attempt to describe the houses of the masses and the character of the indigenous population, only slightly improved since the seventeenth century. Imagine a wide expanse of river, lake, jungle, and plain,—a famous pigsticking district,—about a hundred miles north of Calcutta. It is a broad, populated estate, belonging to an English gentleman, and in the centre of it, on the borders of a lake, is a big white house in which he resides all the year round. He has made miles after miles of roadway, cutting down jungle, filling up morass, and spanning rivulets. The estate is divided into districts, each directed by a native overseer and inferior officers, who superintend, according to their master's will, the clearance of the land, be it jungle or waste, under their charge. The rumour runs, perhaps, that a new road is being made, that it is opened, and that fresh ground is ready to be occupied. On each side of this new road, the land has been cleared, and stakes are fixed from distance to distance. Amidst them, on a given day, a stump of bamboo is planted, and the "tam-

* See p. 627, *ante*.—The Middle Ages.

* Many of them will be found in Dr. Harris's "Voyages."
† Sir Thomas Roe and others.
‡ About eighteen miles from Agra.

* The Ganges is often described as entering the ocean by a thousand mouths.

tam" is beaten. Forthwith, from far and near, come lean and miserable-looking creatures, strong men and rough men, of several shades of blackness, of diversity of low caste and of none; and they are followed by their wives and children. On condition that he till and keep what is allotted to him, each man obtains a strip of land. The materials with which to build a house,—bamboo sticks, reeds, earth, and long grass,—are close at hand; roots to plant and seeds to sow are given to him; and for a fixed period no rent, in money or kind, is exacted. In presence of the well-to-do officials, men of their own religion and language, the incoming tenants are abject in their submission. At the sight of the English owner the men bend to the ground, and seek to touch his feet; the women gather the children about them and hide their faces in their infants' arms. All betray a feeling that the some one before them is removed from themselves by impenetrable and incomprehensible agency; and to such a feeling, in the time of Jahánghir, was undoubtedly added a sentiment of horror and dread.

This Emperor's "Movable Court" was always followed by a vast multitude, and it moved rapidly from place to place. Sir Thomas Roe saw one "set up and finished in four hours, though it was done with very great order and exactness." The Emperor was said to "go a progress," which resembled the remove of a nation. The ministers, court functionaries, a part of the female establishment, foreign ambassadors, artificers of every kind, bore him company. His pavilion was placed in the centre, and isolated from all around. Every one knew what ground to take, and how far from the Emperor he must pitch his tent or raise some kind of shelter; every one knew where to go for the supply of his wants,—for special streets, so to speak, were devoted to different tradesmen, artificers, and others. Elephants, horses, and oxen were arranged in specified places; they were always ready to start for some other camping-place. If any of his followers attempted, after the command to move had been given, to stay in the quarters they had erected, Jahánghir would order their tents or huts to be fired; for his idea seems to have been to raise a city at his nod, and to raze it with the same celerity. In these progresses the Emperor was perhaps carried on an elephant; but in 1638 Albert de Mandelslo told a story of "When the Mogul stirs abroad;" he was then usually mounted on a fine Persian horse, or seated in a coach drawn by two white oxen, or carried in a chair.

The fact that Akbar possessed a councillor as able and wise as Abúl Fazl probably contributed in no small degree to make the reputation for grandeur and goodness with which the name of that Emperor is surrounded. The "Ayin Akbari," a book written by Abúl Fazl, gives a minute but irregular account of persons and things connected with the government of the country, of a town, and of the Imperial household, down even to the clothes and victuals of his Majesty. The minister describes Agra, the city of Akbar, as a large and magnificent city. On both sides of the river Jumna were delightful houses and gardens inhabited by people of all nations. His Majesty erected a fort of red stone, which contained within the walls "500 stone buildings." But William Finch, who passed through the city about five or six years after Akbar's death, says that it was only a village in the time of Akbar, who removed his court thither from Fatahpúr-Sikri. An Imperial city when Finch saw it, the houses of its "considerable people" were built of brick and stone, with flat roofs. Those of the common people were of mud, and thatched, "so that fires once kindled made horrible work in those parts of the city." It is not unlikely that many of the buildings, erected by Akbar and Jahánghir, within the fort of Agra, were pulled down in the time of Sháh Jahán, and their materials used in the walls of his new marble palace. Even in Jahánghir's reign, Finch describes Fatahpúr-Sikri as "an unfinished and partly a ruinous city." This was about 1610; and when he got to Delhi he found it like "many other noble cities of India," lying partly in ruins. Further north at Lahore he remarked that the streets were well paved and the buildings lofty; they were mostly of brickwork, and "set out with all curiosities of carving about the doors and windows." He remarked also the caravanserais along the great routes, especially one between Agra and Allahabad, said to be able to accommodate a thousand men, very well built and well contrived. The road from Agra to Lahore had been measured by order of Bábar; he had directed small minarets, or rather huge milestones, to be set up at certain distances, and two Englishmen who travelled over it in 1610 found every eight or nine miles a fine serai along a road 600 miles in length.

The rule observed in these buildings was never to open before daybreak. European travellers appear to have been astonished with the freedom and security enjoyed within the inclosure. Those who came first were first served, and "'tis in vain," said one, "for any other that comes after him to have a mind to the same apartment." The remains of a large serai are to be seen at Fatahpúr-Sikri, close to the celebrated Elephant Gateway; and there still exists a bridge carrying a closed gallery, through which the fair ladies of Akbar's Hindú establishment passed unobserved to a place in the caravanserai, where the embroideries, shawls, muslins, &c., brought from Persia, Cashmere, and elsewhere, were presented to their gaze. Bernier mentions another important one at Agra, close to the Táj Mabál. He says that city contained more and finer caravanserais than Delhi. One erected at Delhi, at the cost of Sháh Jahán's eldest daughter, was called the Caravanserai of the Princess. It was a large arcaded square, likened by Bernier to the Place Royale, then a novelty in Paris; but "with this difference, that each archway was separated from the other by a partition, and at the end of each archway was a little room closed by a door." An Indian inn, when the Great Moguls were masters of Hindústán, was simply a bazár, such as is still common, built round a hollow square, and approached through a single gateway.*

Our fig. 1† is a type of caravanserai with the entrance at *d*. The arcades, B, run all round, *b*, *b*, *b*, *b*, *b*. The plan of a portion, to a larger scale, is drawn in the middle of our diagram. A is the little room shut by a door, B the

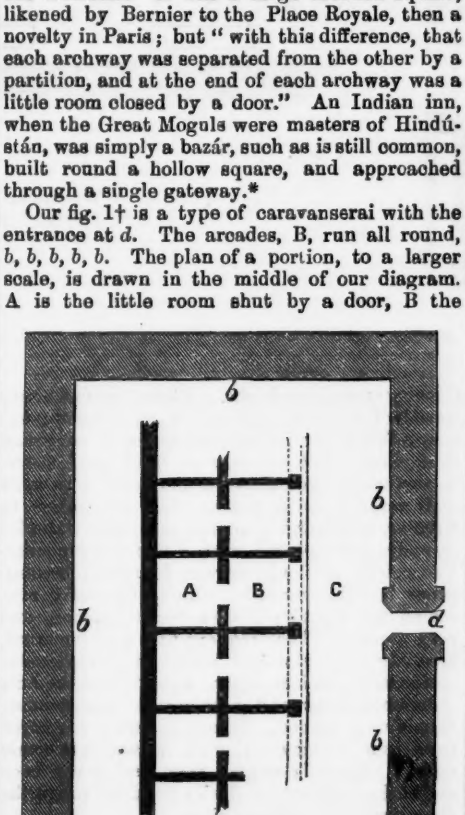


FIG. 1.

open archway separated from its fellow on either side by a partition, and C is the uncovered square open to the sky. A caravanserai was sometimes a two-storied building; and the flat roof, over the arches at B, formed an open terrace, from which the little rooms over A were entered. On arriving, a traveller took possession of one of the compartments B; he placed his goods, for security, in A, and he reckoned his women among his goods. He himself lay in B. If he chanced to get upon the terrace over, his wife and valuables were deposited in the closed cell while he lay in the open upon the terrace. He was within a walled inclosure, a place of security during the hours of the night, and he required little else. A common table or a common kitchen is opposed to the precepts of the Eastern religions. Each traveller had his own slaves and attendants to cook for him and to wait upon him.

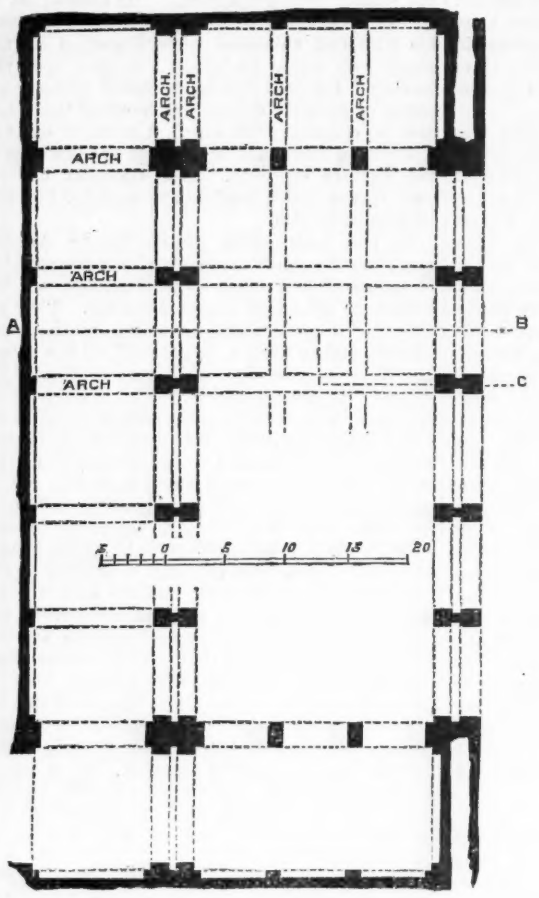
In the instructions drawn up by Akbar's minister, the police superintendents are enjoined to cause all travellers whose persons are not known to alight at a separate serai. They are also to be particularly attentive to the night patrols, and to keep a register of all the houses and frequented roads. This part of the "Ayin Akbari" is most valuable, for it is unspoilt by adulatory phrases and rose-coloured descriptions. The police superintendent in each town is deputed to ascertain the income and expenditure of every man. He is to compel every man who has no occupation to belong to some trade or calling, or to learn some art. He is to select out of each class or caste of artisans one to be at the head of the craft, and another to be the broker for buying and selling. He is to see that the market prices are moderate, that the weights are correct, that the streets are cleansed, that the lanes are kept free from obstructions, that no one enter another's house without the owner's consent, that no private person take forcible possession of another, that no one be bought or sold as a slave, that no woman be burnt with her husband's body against her will, that no one be impaled. It is further directed that the cemetery be outside the city gates on the western side; and that the robe of mourning consist not of blue but of red garments.*

Some of the instructions to the officers of the Emperor's household are equally interesting. Like Louis XIV., Akbar alone sat at the dinner table; his attendants placed themselves around it in "a sitting posture," that is, they squatted on their haunches. Like Louis XIV., more than a hundred years after, Akbar gave his "denier à Dieu"; for first, says Abúl Fazl, "the share of the dervishes is set apart;" then his majesty begins with milk and curds, and after he has dined he says grace. A practice of the court was that the Emperor should be visible to the populace twice in twenty-four hours. At times he held a bar of justice. Then the kettle-drums were beaten; the royal family, the nobles, and the court officials attended in their respective places. Reports were delivered, disputes heard, quarrels adjusted; during the whole time an exhibition of gladiators, wrestlers, and musicians took place. The levee of the Emperor has been graphically described by an excellent writer. A sketch of it, more than twenty years old, though an imaginary, is by no means an unlikely, representation of the probable scene. Mr. H. G. Keene quotes it in his "Agra Guide." The words of Mr. Sherer, condensed, are:—"A roll of drums is heard. . . . . The Emperor is an early riser, and the moment of his rising is announced in this noisy fashion. . . . . Before the gateway a considerable crowd assembles, in front stand handsomely-dressed men . . . . no one with beards, except indeed such strangers . . . . whom neither interest nor necessity compels to conform to the etiquette of the court." Then the door opens, and an officer appears to proclaim in monotonous accents the titles of his master, who immediately afterwards shows himself. He is a broad-chested man, advanced in years, and simply dressed in white muslin with a little gold thread upon it. The appearance of the Emperor is the signal for a loud cry of "Allahu Akbar"—"God is great!" In the same story, very prettily written, there is a description of going to mosque, to what is called a deer-hunt, and to an afternoon discussion; and in the evening Akbar is seated listening to a book. These books are mentioned by Abúl Fazl; they were classed in sciences *according to their several prices*. A part of the library was kept in the quarters of the Imperial women; and this combination of intellectual and bodily delights in the household of the Great Mogul recalls a famous passage

* When, not long ago, the question of providing a building in Delhi for the accommodation of travellers, principally native, was discussed, an answer was afforded by the erection of the "Queen's Serai." It was carried out from the designs and under the superintendence of architects and engineers. As no structure was so suited to the wants of the travelling merchant, or even prince, as the original caravanserai, no modern building is more ludicrously unsuitable for the purpose than the Queen's Serai. It is a pseudo-Gothic building, which cost 10,000*l.*, and it contains thirteen towers with pointed roofs, eight of these towers, representing nearly 39,000 cubical feet of construction, are mere waste space; there are neither windows to ventilate them, nor doors to enter them. Nothing in North-Western India can illustrate so miserably, not the genius, but the common sense of the modern builder, when his work is compared with even that of Aurangzib, as this neglect of preceding example in the erection of a Serai.

† Fig. 1 is perhaps a little difficult to understand, for it really consists of two diagrams. The caravanserai itself is simply a quadrangle surrounded by buildings which we have etched. The plan of a part of these buildings is inserted, for economy of our space, in the quadrangle. Neither plan is drawn to any scale.

* Abúl Fazl, in his references to the wardrobe, mentions the manufacture of shawls in Cashmeer; in Lahore, he says, there were "a thousand" manufacturers. "Formerly," to use the words of the translation, "shawls were but rarely brought from Cashmeer, and those who had them used to wear them over their shoulders in four folds, so that they lasted a long time. Now they are worn single by people of all degrees. His Majesty (Akbar) has introduced the custom of wearing two shawls, one under the other." He also says that clothes fabricated in Persia, Europe, and China "have become cheap and plentiful."



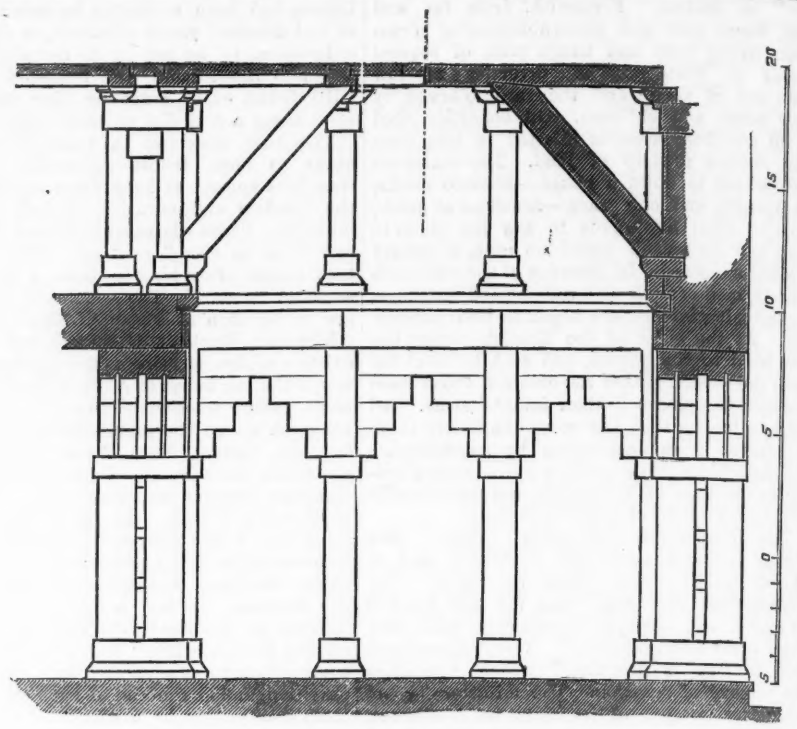


FIG. 2.

SECTION.

Through Line A . . . . B on the Ground Story.
Through Line A . . . . C on the Gallery Floor.

about the son of Gordianus. "Twenty-two acknowledged concubines and a library of 62,000 volumes attested," says Gibbon, "the variety of his inclinations; and from the productions which he left behind him it appears that the former as well as the latter were designed for use rather than ostentation." We suspect that the historian's figures have an Oriental taint, and our suspicion offers a double excuse for recording the parallel. Akbar, however, is said to have heard a book diligently from beginning to end, and to have paid the reader according to the number of pages.

If our readers will turn to Mr. Fergusson's "Indian and Eastern Architecture," they will see, at page 592, a plan of the Palace of Delhi as it was in the reign of Sháh Jahán, who built it, together with the best native buildings of the present city, then called Sháh-Jahánabád. The avenues and arcades in the plan respond to Bernier's description of them in the time of Aurangzib. One of the streets was covered by a long and wide vault, which had openings for light at the top; and on either side of the passage were shops. Artisans of all kinds were located within the walls of the fort during the day, in special bazárs divided among particular trades. There were the embroiderers in one part with the chief who superintended their work; in another were the goldsmiths, in another the painters. Carpenters, turners, tailors, bootmakers, workers in silk and brocade, and in cloth, were to be seen in their different quarters. They came at sunrise, worked the whole day, and returned at sunset to their homes in the city. Outside the castle walls, Bernier does not seem to have found good workmen, though he admits that many of them made "very pretty workmanship;" and that they imitated the European work well. The two principal streets of the city led in a straight line to the two gates of the castle. On both sides were arcades with a terrace over; while at the end of each archway was a little store, and a partition between the arches, as we have already described in the sketch of a caravanserai. Each archway was a shop, in which artisans worked, merchants exhibited their wares, and bankers piled their coins. During the night the different goods were locked up in the store. The shopmen lay coiled up in a thin covering, huddled together upon the empty benches; the master sometimes slept on the flat roof over the shops, and his dwelling-house was often built upon the walls of his store; though many of the merchants retired after business hours to houses in other parts of the city or in the suburbs. These arcaded shops were built of bricks, and probably plastered; but only a few of the private houses in Aurangzib's time were built entirely of brick and stone. Nevertheless, even those made of dry earth walls and covered with thatch had, according to Bernier, courts and gardens; and their walls internally were coated with a fine white plaster. The ceiling of the house was formed of bamboo canes laid horizontally, which effectually concealed the thatch; it was "hard, strong, and very pretty." The frequent fires that occurred, recalling the classical description of similar accidents in Ancient Rome, were due to the huts of bamboo, straw, and earth in which the common people were lodged. Thousands were destroyed from time to time; therein horses that could not be loosened; women that had never been out of their prison,* and who could not brave the open street, were burnt alive.

A house of the better class was arranged with some regard to position and distribution. To be properly placed in Delhi it must receive the wind principally from the north. That position varies in different parts of India, and in Calcutta all the best rooms of a modern dwelling are made open to a verandah facing the south. In the account by Sir Thomas Roe of the houses in the Mogul's country the rooms are described as "nowhere adorned with fine hangings" or encumbered with furniture. Painting on the plastered wall served instead of the tapestry with which, in the seventeenth century, rich Europeans were familiar. On the floor of an Indian house was spread a carpet, which was bed, table, chair, and stool to the inmates. Some of them used a hard quilt on which they lay, "or else a low thing like a bedstead, and bottomed with cotton cloth," which moved up and down with ropes, so that their servants could rock them to sleep. Fifty years after, Bernier found in houses he visited the pavement covered with a mattress of cotton, 4 in. thick, upon which was spread a fine white linen sheet in summer, and a silk carpet in winter. In one corner of the room, next the wall, were "one or two cotton quilts with fine flowered coverings, and set about with fine and small embroidery of silk, wrought with gold and silver for the master of the house, or persons of quality, to sit upon." Round the walls there were arranged several of these mattresses, with pillows and bolsters laid loosely upon them. Just above the height of a man, there were openings in the walls; these were filled with perforated panels cut in a hundred devices, similar, doubtless, to the stone and marble screens which surround many of the tombs. Nowhere was there any glass. Vases filled with flowers were placed in the openings; the ceilings of the rooms were painted and gilded, and according to Bernier there were then several houses in Delhi of an equally ornate description.

Many of the cities of North-Western India are striking from the bright colour of the red stone with which the larger buildings are constructed; and both the red and white stones are wrought in an extraordinary manner. William Finch said it was remarkable that most of the Indian quarries, especially those about Fatahpúr-Sikri, "do afford a stone which may be wrought any way by the workman, either cleft like logs, or sawn like planks, into vast great pieces, so as to ceil rooms or cover houses with, if they had a mind." A Hall on one side of the quadrangle of what is called Jahánghir's Palace, at Agra, is entirely constructed of red sandstone; and Finch perhaps saw it erected, or in course of erection. Our fig. 2 consists of a plan and diagram section of it, from a sketch made on the spot; and it shows some of the openings as they originally were, not as they are. Stairs in the thickness of the front wall, on either side of the five doorways, lead to the gallery; a series of small arched window-openings over the doorways, and arranged just under the projecting stone eaves, give light and air to the Hall. Another building of a similar size, but differently arranged, forms the opposite side of the quadrangle; and the whole is often said to be part of the buildings originally built by Akbar. Little direct evidence exists to show when they were built, except that it must have been anterior to Sháh Jehán, during whose reign the portions best known of the existing palace were constructed. Our diagram shows a remarkable curiosity of construction: the pillars, struts, beams, panels, ceiling-planks, &c., are all of red sandstone, put together as a carpenter joins wood. The whole surface of the stone is elaborately carved, and the blocks of lintels and corbels, which we have shown with square edges, are fantastically cut into delicate mouldings and ornaments. It is the work of Hindús whose building traditions were based upon the early

* Bernier's mention of the inflammability of houses in the Mogul cities is remarkable, because, in his time, great fires were by no means rare in Paris and the provincial towns of France. But his notice of the women who feared the light is not remarkable. At the present hour many a petty clerk in a Government office in Calcutta keeps his women and children locked up in an outhouse behind iron bars

and exclusive use of wood; and much of its peculiarity is due to the novel demands made by the Muhammadan conqueror upon the skill of the workmen. The fact that the method employed by the Hindús in the construction of stone buildings for the Muhammadans is carpentry and not masonry, does not imply that they imitated the wood buildings they had already erected, or the remains of which existed. That, however, wooden Halls, Temples, and shelters of all kinds, were erected in India century after century, no one will dispute. We do not doubt the possibility of such a Hall, as that shown in fig. 2, having existed in Banáras about the sixth or seventh century of our era, and of its having been constructed entirely of wood. At that time a Chinese traveller visited the eternal city; he left a narrative of his journey, and of the countries he saw, which has been translated by a learned French scholar. Upon the strength of a literal translation of this work, in which the kingdom of Banáras is described as 667 miles in circuit,—containing villages numerously-populated which lay very near to each other, and in which resided families of great wealth, whose houses were stored with rare and precious things,—M. Viollet-le-Duc has concocted a Hindú palace belonging to a rich merchant, who respected the law of Búddha and deprecated the heretical doctrines of Hinduism. No chapter of "L'Habitation Humaine," or the "Habitations of Man in all Ages," is more studiously replete with the charms of unalloyed fiction than that in which M. Viollet-le-Duc gravely describes "L'Inde Boudhique."

What had been only possible to Voltaire, in a history which he intended to write of the conquest of Bengal, has been actually accomplished by his countryman, the well-known archæologist and architect. Macaulay said of Voltaire that he would probably have produced a book containing much lively narrative and many grotesque blunders about virtuous and philosophical Brahmans. This feat has been successfully performed by M. Viollet-le-Duc in the compass of a chapter. At page 261 of "L'Habitation Humaine" is the plan, in black and white, of a rich merchant's house of about the years of grace 550—650, and it covers a surface of construction measuring 217 ft. by 112 ft. There is also a sketch of the "Intérieur du Palais Hindou," one of its rooms being an enormous Hall, three stories high, with galleries and columns broader, larger, and loftier than the stone Hall at Agra, shown in fig. 2. It is the residence of Kalanta, who encounters Epergos and Doxi at a public meeting held to discuss certain points of doctrine concerning the law or religion of the country. A taint of "Belleville" pervades the scene; Doxi and Kalanta sympathise in their respective and almost identical convictions. They retire to Kalanta's palace, prettily placed on the banks of the Ganges; and Epergos roams all over the house to learn a little of its architectural beauties. In the uppermost story of the Hall, which M. Viollet-le-Duc has imagined, the wind, dust, and heat are admitted through wide and tall openings totally unprotected by any verandah, screens, or blinds. Openings in other parts of the building are surmounted by a one-centred arch, similar to the ordinary London brick arch. The ceilings are supported by enormous beams of wood carved and painted, partly in the Western Gothic style. The doorways are filled with tapestry hangings; the floors are paved with stone, alabaster, or marble. Almost every accessory of the modern habitation is introduced. There is a kitchen in the very house itself. This kitchen and a provision store, or perhaps a larder, are so placed that the Brahman,—if there were Brahmans in "L'Inde Boudhique" twelve or thirteen centuries ago,—must rub shoulders with the uncleanest of his servants; with men even of no caste, if there were caste-prejudices in the Banáras of M. Viollet-le-Duc. This "Palais Hindou" is surrounded by vast gardens,—a Hindú had no word for a garden, which was an artistic luxury introduced by the Tartar settler,—and these extend to the water's edge. Towards the west, Epergos could see the Ganges lose itself in a plain covered with brilliant vegetation; towards the east the city of Banáras; and northwards appeared to him the first slopes of the Himalayas! All this, gravely strung together, is supported with the audacity of fame and name. If the author has not endowed his "Palais Hindou" with a w.c., similar to that which is shown in his suburban villas of Upper Egypt—of some 5,000 years ago—he has equally forgotten private apartments for the Indian women. At the same time we are disposed to make a consolatory admission. If M. Viollet-le-Duc has successfully brought the Himalayas within sight of Banáras, Shakspeare carried Birnam Wood to Dunsinane without rendering the legend ridiculous; and Sir Walter, from his Scottish coast, caused the sun to set in the German Ocean without losing the sympathy or respect of his readers.

A GREAT MINERAL RAILWAY.

OUR great railways are becoming territorial lords, and no district has been given up so fully to one monopolising "common carrier," as has that which gives its name to the North-Eastern Railway. There are from Hull to Berwick one or two small separate lines, but their length is small, and most of them are controlled by the railway which is amongst the great lines the one chiefly formed by combination. Whilst one of the four great railways of England has been "made," another has acquired its length largely by purchase, a third by leasing, and the fourth—the North-Eastern—chiefly by amalgamations. Formed by the union of three competing lines, each of which has swallowed up others, the North-Eastern of to-day is very largely increased from what it was when, two dozen years ago, the York, Newcastle, and Berwick, York and North Midland, and Leeds Northern Lines formed it. And a very large proportion of that increase has been due to the amalgamations that have taken place. Small agricultural lines like the Bedale and Leyburn, colliery branches such as the Dearness Valley, and mineral lines such as the North Yorkshire and Cleveland, have been included, whilst systems of railway of some extent such as the Stockton and Darlington and the Newcastle and Carlisle have been also taken into the wide maw; and the later additions of the Blyth and Tyne and the Whitby, Middlesbrough, and Redcar lines have given to the North-Eastern a practical monopoly of the great district it serves,—covering the bulk of Yorkshire, Durham, and Northumberland. With the Stockton and Darlington it acquired possession of the oldest railway, with the West Hartlepool line it became the owner of the port which on the north-east coast may be described in Mr. Gladstone's words as "the youngest born of England's greatness," and with these it has added the rich dower of the great Cleveland iron fields to its almost entire possession of the great northern coal-field, and has become the richest mineral railway in the world. Not only does it serve the most productive of our coal-fields, and that iron-field which has the largest output, but it is the only line entering into the great lead-mining district of the North; it serves the timber-importing ports of the North, and it has a varied and growing wealth of industries to serve, and though now its position is that of one feeling the great depression in trade, its prospects seem to brighten for the future.

When the North-Eastern Railway was constituted twenty-four years ago, its revenue was small, but even then the goods and mineral traffic gave greater receipts than those of passengers, and this continues. The capital of the company now approaches sixty millions; in exact figures, it was at the close of last year, 58,895,531*l.*, the bulk of which authorised capital has been also created, and the larger part received. It may be added that the expenditure of this sum has been in the following mode:—On lines and works open for traffic, 43,281,426*l.*; and on lines and works in course of construction, the balance, exclusive of 9,030,968*l.*, spent in the provision of rolling stock, and about a quarter of a million in subscriptions to other and allied railways. At the present time the company is committed to works in progress or in contemplation which entail an estimated expenditure of close upon three millions, and this expenditure is now proceeding at the rate of over a million and a half yearly. The return from this vast investment of capital is necessarily large: at the commencement of the North-Eastern, its revenue was 782,000*l.* in the six months, but it is now 3,339,000*l.* in the same period, and this large growth has been distributed, though unequally, amongst the various branches of traffic. In the last half-year the passenger, parcels, and mails traffic yielded within a few pounds of one million; the goods traffic realised 1,038,681*l.*; but the mineral traffic, though seriously depressed, returned 1,187,071*l.*, and subsidiary receipts made up the balance. Of passengers, there were carried on this vast system no fewer than 15,827,625 in the six months—691,237 only being first class; 1,023,033 being second class; and the great proportion of 14,113,355 being third class. Of the mineral traffic little more can be said, for the figures are self-explanatory, the great bulk being derived from the Cleveland iron trade, and the great coal trade of the North. Its vast growth has been previously dilated on, and it may be sufficient to indicate the growth in less than thirty years of the iron trade of Cleveland from one almost unknown, even locally, to the largest output of ironstone of any mining district in the world.

In mileage the railway has grown greatly; its length is now about 1,500 miles. Over these, in every half-year, the passenger trains run a little over four million miles, and the goods and mineral trains nearly seven million miles. The rolling stock is formed by close upon 80,000 pieces,—1,364 being engines, 2,589 coaching stock, 29,418 merchandise wagons, and 46,612 mineral wagons. Out of the gross revenue of over three millions, there is spent every half-year a little more than one-half. The chief cost is for locomotive power, for which item again the chief constituent charge is for wages, and next for coal and coke. The item of wages alone in the various departments claims close upon a million sterling yearly, and there is a further amount which is included with salaries. For coal and coke for locomotive purposes only, above a quarter of a million is now annually spent; for compensation for loss of goods and damage to goods and person the annual charge varies from 40,000*l.* to 50,000*l.*; for rates and taxes the company has to pay about 130,000*l.*; and for Government duty it pays above 40,000*l.* yearly. The length of line has been previously stated; but it may add to the idea just given of the extent of the company if it be added that of the miles maintained, 480 are single, and the great bulk of the line,—928 miles,—is laid with double or treble lines or more.

The bulk of the receipts, as has been shown, is derived from the mineral and goods traffics; but of late years the proportion which is derived from the passenger traffic has been increasing,—a fact which is the more noticeable inasmuch as the mineral traffic was at first stationary, and has recently shown a decline. The dulness in the coal trade, and the serious depression which has so long existed in one branch of the iron industries, have very greatly affected the receipts, insomuch that this half-year, when compared with the receipts for the corresponding period of last year, the receipts show a falling off of over 3,000*l.* weekly on the average. Probably depression and the consequential loss have reached their full extent, and their recovery may be looked upon as a question of time. For, although the mineral traffic is the preponderating one, it forms only a part of those giving the company its income. Traversing so extensive a district, and serving at once industries so varied, the loss of a portion of any traffic can only have a temporary effect on the whole. And, as in former periods of adversity, the receipts of the company have shown a fall, it has proved, and will again prove, a mere ebbing of the tide, which, when the flood sets in, will again flow past the highest mark it has previously made. And in the great industries whose dulness thus registers its effects on receipts and dividends, there cannot be any doubt that the period of improvement must shortly set in. During the years of what were deemed prosperous trade, there were engendered serious evils,—prices were forced up by intense demand to an abnormal pitch, and production was stimulated to an excessive extent. These evils are now being dealt with. Prices in the years of depression have been brought down to a level, and production has been very greatly kept below what the facilities exist for. In these modes, then, some of the evils are being met; there is a settling down to a more normal condition of trade, and an attempt to bring business into a more satisfactory condition is in progress, the effect of which will be that confidence will be re-established. Drawing its income from many industries and from many countries, the North-Eastern has felt the depression in that great industry, and may therefore long for its revival; for with that revival its own return to the state it knew three or four years ago will be assured. As it is, there are symptoms that its fall has known its full amount, and if so, the change to improvement is at hand.

THE LONDON OBELISK AND EGYPTIAN WORK.

GREAT London, it is certain, must in time be, if it is not now, as remarkable for the variety of art and architecture it possesses, as it is for its hugeness and extent, and the multitudes who inhabit it. It will in time, too, be as remarkable for the specimens it has every here and there of art foreign to itself, and its ancient remains. These are, indeed, already of all times and phases of art, and we are, as all know, to have in no long time another not a little remarkable specimen of antique art, and to be placed somewhere,—an Egyptian *obelisk*, Cleopatra's Needle, as it has been somewhat oddly called,—a remarkable monument of the past of things in this world, and indeed a history in itself. It may be, therefore, of some interest to hint at a few things to which this strange monument affords a sort of key; for could all things be told about it, and its origin, and its purposes in the place from which it comes, and all be brought to light, what a strange tale it would tell, and how deep into the old world's history would it lead. We can but hint here at a few things, and but glance at this monument, and read, may be, a little of the inscription on it, and of the things about it. In the first place, it is to be borne in mind that this solitary monolithic shaft is not complete in itself, and as standing alone, as it will do when it forms one of the many wonders of London; but it, like so many others in that strange land, Egypt, from which it comes, is but a part of a great system or whole. It was an item in a temple, or pile of buildings, devoted to the special worship of some pagan deity. Obelisks stood in pairs opposite each other, and must have formed *in situ* objects sufficiently remarkable and significant.

It would be difficult, without a somewhat elaborate plan, to make the position of the Egyptian obelisks quite plain. The temples, including the court-yard in which the obelisks stood, took up a large space of ground. The temples differed, according to their size and situation, in details and arrangement, but the main idea was the same, and in this main idea the most notable perhaps was the provision that was made for those long and imposing religious *processions* in which the men of Egypt took such delight, and which, indeed, went so far to make up their very religion itself. The successive gateways, the very walls of the temple, the long line of recumbent animal forms, the obelisks, the seated colossi, the pylons or gateways within the temple court or enclosure, the arcades, and the covered or roofed enclosure itself, in which the statue of the god was enshrined,—all seemed to be devised with the one object of giving effect and meaning to those imposing processions and shows. No small impulse, too, to the fine art of Egypt must have come from the sight of those world-notable displays.

All this went to make up the general plan and idea of the Egyptian temple, and all certainly had its material or symbolic use. Ornament, in one sense, and as mere ornament, there was none, for the whole temple and pile of buildings were simply written upon, both within and without, as on its four sides is this very obelisk. Even the capitals of the columns would appear to have been wrought out with a symbolic meaning, and the hieroglyphics to be seen everywhere, and on every otherwise vacant stone or granite surface, were there to be read by all who could read them. In short, an Egyptian Temple was an open book, and in passing through it you could but read what was written on its walls and ponderous blocks of stone or granite.

We have said that by going into details some very considerable space might be taken up, and it is difficult to know what best to select, there being so much that is noteworthy. But perhaps the most striking thing to be noted first in Egyptian undertakings was the enormous size and consequent weight of the blocks of stone which they quarried, and moved from place to place, and lifted into such all but impossible places, and all, too, with such truth and accuracy of fitting and fixing. Sir G. Wilkinson notes not only the immense size of the quarried blocks, but the confined and awkward places from which it was necessary at times to move them. The obelisk, to cite but a single example, transported from the quarries to Thebes, measured no less than 90 ft. in length of one single stone. Nothing seems to have broken the heart, or the "lifting" courage and patient strength of the old Egyptian. Sir Gardner calculated the weight of one single block at Karnak,—the "mighty" Karnak, as well called,—at no less than 297 tons; and this had to be moved to no less a distance than,—incredible as it seems,—138 miles! And even this, great as it is, is by no means the largest or the weightiest of the ponderous masses which the old Egyptian mechanics and workmen contrived to move and lift into place by mere force of multiplied manual labour.

But, perhaps, even more surprising than the lifting and moving of these ponderous blocks are the wonderful artistic precision and accuracy with which they have been placed and fitted together. There are no broken joints, edges, or corners, and the lines are as straight and true as a straight-edge. We are here noting the simple masons' work only, for the practical difficulties to be encountered and mastered here, though the work may seem to be simple, can hardly be overestimated. Doubtless this obelisk, which is to add to the curiosities of London, will evidence a little of this. Not far from the banks of the river, on which it will be floated here, can it be taken, say the authorities; but, wherever it may be, its workmanship, as workmanship, may be then compared either with that of the granite-work of the Embankment or with any other mason's work near it. Much more in detail might be noted on the subject of this work of the old Egyptian mason; but there is in the Egyptian sculpture and deep-cut carving room perhaps for even greater wonder at the skill displayed, and at the accuracy of eye and hand. Obelisks are covered on all sides with hieroglyphics, and the cutting of these was among the many other masterly things which the Egyptian workman of old could do so well. In the obelisk that is coming here we shall find evidence of this skill; but even without it, this may be seen in the British Museum, where are a number of examples of it, admirable alike for executive skill and inventive and imitative power in the rendering of animal and other forms. Indeed, there may be found marvels of executive skill The hardest black marble has been incised with a truth and finish not to be surpassed. No one, says a practical judge of such matters, who has ever tried to perforate or cut into a block of Egyptian granite will scruple to acknowledge that our best steel tools are turned in a very short time, and require to be retempered. This the French engineers found when the Luxor obelisk was moved from Thebes; and even, it is added, with the best of modern tools, we find considerable difficulty in doing what to the Egyptians would have been one of the least of their arduous tasks. The more this work of antique Egypt is looked at and attentively studied, the more will it become evident how much there is to be learnt from the study of Egyptian monuments.

Whereabouts in London this fine work of Egypt's artists is to be placed is at present uncertain, and how and in what manner it is to be treated is equally so, but let us hope that no attempt will be made to tamper with it in any way, or to do otherwise than place it as obelisks are usually placed when *in situ*, so that nothing may be visible to disturb the impression which such an art work is calculated to make on the thoughtful student and observer. We deprecate, as others have done, the plan sometimes adopted of adding to the pyramidal top of an obelisk, as the French have done at times, and as the old Romans did, thus destroying that harmony of lines and simplicity of form which make of the obelisk what it is, and what the Egyptian meant it to be. Its beauty lies in the very simplicity of its outline.

Among many other points to be noted, and for which we have not space, there is one out of which some good ought to come, and it is most instructive. It is the admirable way in which the Egyptian artists contrived to treat the surface of their hard granite. It is admirably polished, yet is the colour of it not in any way destroyed or marred; and though so polished and smooth, it does not reflect light, like an imperfect mirror. In proof of this the colossal heads in the British Museum galleries should be looked at and studied, and then compared with reference to the injudicious way,—as we take it to be,—in which the granite bases or pedestals, on which they stand, have been treated. These, all of bright red granite, are polished like looking-glasses, and quite kill the heads above them by the violence of the contrast. The best way to polish granite is a problem. We trust that in any attempt (if there be one) to repolish the obelisk, this useful and patent fact may be taken note of, for the incised hieroglyphic all but disappears if care be not taken.

One more thought, out of many, and we commend it to engineers. It will depend a good deal on the position in London town of this huge monolith as to how it looks, and what impression it makes, and the Thames Embankment has been suggested as the most appropriate of spots for it, looking at the immense difficulty, if not impossibility, of moving the granite block far from the river. Surely the moving of it ought not to appal modern engineering! It may be a question, indeed, as to what site in London is the best for such an isolated and foreign fragment of art as this, but it may usefully be borne in mind that a very great deal of the impressiveness of the obelisk, when on its own native ground, depends on its close proximity to a building, which it thus emphasises and helps to make complete. In a court-yard would seem to be its appropriate place, and in front of the main entrance to some building. The court-yard of the British Museum would be an appropriate site for this great obelisk; but we rather incline to the Embankment, if a fitting spot with appropriate surroundings can be obtained.

SOME FAMOUS FRENCH ARCHITECTS.

PHILIBERT DE L'ORME.

IT has often been the subject of remark that painters have attracted more attention than architects, whose work the general public are utterly incapable of appreciating. Even in the present day the names of the most distinguished architects are almost unknown to us, whilst a considerable number of painters possess great popular renown.

With few subjects is the public, even in France, less acquainted than with the lives of the great French architects whose birth preceded the reign of Louis XIV. It is easy to understand how in the Middle Ages, when the artist and the artisan worked so intimately together, and when few people were distinguished except in politics or religion, the constructors of the cathedrals of Rheims or of Paris found no biographer; but when we arrive at the period of the Renaissance, when the arts were cultivated with passion, it is somewhat strange that men as famous as Philibert de l'Orme, Pierre Lescot, or Jean Goujon, should have shared the same fate as Pierre Montereau, Jean de Chelles, or Robert de Coucy, some 300 years previously had suffered. Not that Lescot and his professional contemporaries did not enjoy during their lifetime the renown which their merit entitled them to; the recompenses they obtained from their patrons, the warm terms in which they are spoken of by authors of their time, and the general admiration their works inspired, make it additionally strange that no one at the time should have thought of consigning to writing the date even of their birth; and little did the poet Ronsard, in addressing some verses to the "Abbé de Clagny" (Pierre Lescot) think that in so doing he left to posterity an invaluable monument in the recital of the life and some of the works of his esteemed friend.

From the utter meagreness of details, it would be rash and unprofitable to enter into any lengthy account of the lives of the famous architects who came before the great Revival.

All that is known of Jean de Chelles is that he commenced to rebuild, in 1230, Notre Dame at Paris; of Pierre de Montereau, that at the same period he built the beautiful Sainte Chapelle; of Robert de Coucy, that he worked at the cathedral of Rheims at the commencement of the fourteenth century; of Robert de Lusarche, that in the thirteenth century he commenced the cathedral of Amiens; of Guillaume de la Brousse, that under his episcopate, about 1314, the cathedral of Bourges was rendered one of the most magnificent buildings in the world; and thus might we continue through many names and centuries. But all is doubt and uncertainty, and even with the architects of the sixteenth century there exist obstacles in obtaining information of their lives.

Thus it is that we commence with some of the most famous architects of the Renaissance, in whom we are all interested, and whose names in the present day come constantly under our eyes.

Foremost among the architects of that period stands Philibert de l'Orme,* who was born at Lyons about the year 1515. Early fired by the desire to visit the land the fame of whose classic monuments, together with that of Bramante, Leonardo, and Raffaelle, had spread far and

* Such, M. Berty tells us, in his interesting life of the architect, is the true orthography of the name.

wide; fired also by the desire to see more of a people who had left such vestiges as those that covered the south of France, young De l'Orme at fourteen sets out for Rome, where, in spite of his youth, he immediately, with incredible industry, proceeded to measure, personally and with great care, many of the public buildings of the classic times. Associating not only with those learned in architecture, but in all the sciences connected with it, he specially interested himself in the imaginary restoration of ancient buildings; and in pursuit of this object he chose the most complicated problems, and, supplying by his genius those data wanting, he succeeded in reproducing monuments of which history had left but vague or imperfect descriptions.

Thus it was that he proved the existence of Caius Scribonius Curio's construction, consisting of two theatres built of wood, sufficiently distant from each other to allow of two different representations taking place at the same time; at a signal these two semicircles (with all their seats) moving on a pivot closed together, and thus was formed a vast circular amphitheatre, in which gladiatorial shows took place, and all this before the same spectators, who had thus changed their spectacle without having changed their places. De l'Orme made a model of the theatre, and by this fact we can recognise the early strength of his inventive genius.

Passing rapidly over that period of his life in which he was employed by Alexander Farnese, Pope Paul III., in 1536, we find De l'Orme back again in his natal town. Why he left Rome would have been difficult to say, had it not been that he tells us himself that his brother, Jean de l'Orme, and Guillaume du Bellay, the cardinal, allured him from the Pontifical service, and caused him to return to Lyons, where he appears to have worked for some years. In 1542, Cardinal du Bellay induces him to come to Paris, where he wishes to confide to him the construction of his château de Saint Maur. It was undoubtedly through the same influence that not long after he was introduced among the king's officers, and received an important post as inspector of the coast of Brittany, and in 1546 we find that he saved the port of Brest from being seized by our fleet.

On the accession of Henry II., in 1547, De l'Orme henceforth became the king's architect (*architecte du roi*), and thus he is styled in several of the *Comptes des Bâtiments royaux*. From this moment De l'Orme is the favourite of Henry and Diana of Poitiers, for whom he executed some important works. Notably among these stands the château of Anet, which Henry purposed as a present to his famous mistress.

In 1552, the king ordered the old manor-house to be destroyed, and charged De l'Orme with its reconstruction. Left entirely free as to cost and design, and desirous to please his royal master, the architect worked at the château with extraordinary zeal for several years, beautifying, in every possible way, each portion of the building. The chapel still exists to attest the luxuriance of the decorations.

The château of Anet, from the fact that the Tuileries have been so greatly transformed, will remain, notwithstanding that most of it was destroyed at the end of the last century, the most important work which exists that can be attributed to Philibert De l'Orme. Thanks to the energy of the never-to-be-too-highly praised M. Lenoir, the principal gate of the château was saved from the revolutionary vandalism, and now forms a conspicuously beautiful feature in the court-yard of the École des Beaux Arts at Paris.

In addition to the château de Saint Maur, built for the Cardinal Du Bellay, and the château de la Muette, near Passy (the site of which, for the original building was destroyed in the Revolution, forms now so conspicuously beautiful a feature of the Bois de Boulogne), we find that it was also about this period that De l'Orme erected the portal of the chapel of the Park at Villers Cotteret, in which he tried to realise that he first conceived the idea of creating a French order. The columns of the portico, not being able to have them monolithic, from the difficulty of bringing the blocks from the quarries, De l'Orme determined to compose of four or five drums superposed, the joints of which he covered by bands of moulding, in such a way that, says he, they seemed "entirely of one piece, looking very charming and graceful." He appears to have liked the combination exceedingly, and he calls it the *colonne française*. Be this as it may, questions have been raised about the principle, from the fact that the rings placed at different portions of the shaft give the idea of feebleness, at the same time that they take away from the grace. The invention was, however, ingenious in meeting a difficulty satisfactorily.

But it was in 1564 that De l'Orme commenced to build his most famous work. Catherine de Medicis, regent of the kingdom, desiring to raise a palace which should surpass everything that had yet been built in France, chose a spot of ground on the banks of the Seine, near the Louvre, occupied at the time by a tile-kiln (*tuilerie*), and here, in due course of time, rose from the plans of Philibert de l'Orme (to whom the queen had confided the task), the celebrated palace of the Tuileries.

The architect's original project, which Du Cerceau has preserved for us in the second volume of his well-known work "Les plus excellents Bâtiments de la France," was much more important and imposing than that which has since been carried out. Of his gigantic plan, De l'Orme was only able to realise a small portion, the half, in reality, nearly the whole, of one of the large blocks of building represented by the central pavilion and the adjacent wings, so miserably disfigured later on by the successive additions and changes executed under Henry IV., Louis XIII., Louis XIV., and in this century. Indeed, the central pavilion has alone preserved of De l'Orme's design the lower order, composed of Ionic columns, each with five sculptured bands in marble. It can never be too much regretted that the superstitious belief in astrology, which the queen participated in, caused the work of the Tuileries to be abandoned, and it is more curious as she appears to have taken an extraordinary interest in the progress of the work, for De l'Orme tells us that "she was the principal architect, only having left to him the decoration."

Not only Governor of the Tuileries, but *ordonnateur* of the buildings and manufactures of France, councillor of the king and almoner, De l'Orme was also presented with the revenues of several abbeys. It was this profusion of royal favours that undoubtedly raised the self-esteem of the artist, and excited the jealousy of his contemporaries. Among the stories told of the effects of this feeling, one is famous. Ronsard, the poet, having published a satire, "*La Truelle crossé*," blaming the king for the sums he gave to his masons, De l'Orme on one occasion revenged himself by refusing to the poet, who was following the queen, the entrance to the garden of the Tuileries. Ronsard, justly irritated, immediately wrote on the gate, in capital letters, the following words, "FORT · REVERENT · HABE." Not long after the Queen, having seen these, demanded, in the presence of the two, the meaning of the words. Ronsard took upon himself to translate them, on which it proved that they were the first words of some lines by Ausonius, councilling modesty to the man whom fortune has suddenly raised.

> "Fortunam reverenter habe, quicunque repente,
> Dives ab exili progrediere loco."

The Queen, it appears, found the lesson a good one, and even reprimanded the proud artist, informing him that the Tuileries were dedicated to the Muses.

Before concluding the notice of the principal buildings which Philibert de l'Orme was employed to build, let us not forget to mention among his numerous mechanical inventions the construction of a timber-roof which deserves something more than passing notice.

The enormous pieces of timber found necessary in the building of the roofs of the royal mansions having been difficult to procure, the forests having been already exhausted of their finest trees, De l'Orme, to remedy this inconvenience, imagined a new system of timber work. The first mention of his idea at court was met with some ridicule, but Catherine de Medicis having on one occasion expressed her astonishment at the price of a roofing of a tennis-court to be erected at Monceaux, De l'Orme judged the opportunity favourable, and proposed his system. The trial of it was made at the château de la Muette, near Passy, and it was found to be successful. Without entering into a technical description of the process he employed, we may state that in De l'Orme's invention we have clearly the Mansarde roof, which bears the name of an architect who was not its inventor. The true discoverer has, however, left his name to the system, which is sometimes called in France the "*couverture à la Philibert De l'Orme.*"

In order to propagate his new principles, the knowledge of which would serve the public, Henry II. had charged the author with establishing the rules in a special work, which has for title, "Nouvelles Inventions pour bien bâtir et à petits Frais," composed of two books, a sequel, indeed, to another work in nine books, entitled, "De l'Architecture." Principally recommendable by the precepts relative to the shape of stones and the direction of buildings "in which the author was more consummate," as Chambrai says, "than in the composition of orders," this treatise contains in addition, on the moral part of the art, excellent counsels to which the authority of his talent and experience give the character of aphorisms. Throughout the work, indeed in all he wrote, reigns a strongly religious sentiment, simply expressed, and when his thoughts rise towards the great and supernatural architect, his style rises with them.

Having issued the first volume, he was preparing to bring out a second, in which were to have been treated many new notions on the cutting and dressing of stones, a general theory on the proportions of the orders, different treatises concerning perspective, the construction of seaports, that of bridges of a single arch over large rivers, &c. A detailed examination of the Pantheon at Rome, and several other antique buildings; a description, or, rather, a history of the Palace of the Tuileries; an account of the house which he was building for himself in the Rue de la Cerisaie.* Death, however, struck him down whilst he was putting in order these materials thus lost for ever to science and art. His great career terminated at Paris in 1570.

In attempting to form a critical opinion of De l'Orme's architectural abilities, we in the present day have little of his work left us to judge by. Unhappily, the great part of his conceptions have been destroyed, and in those which remain so many modifications have been introduced that it is with difficulty that one can form a just opinion of the artistic merit of the architect. Undoubtedly he cannot be compared with Jacques Androuet in imagination, or with Pierre Lescot in purity of style, or again with Jean Bullant in the distribution of his plans.

According to the opinion of M. Berty, a most able writer and critic, De l'Orme, from having broken entirely with the Gothic, and always filled with recollections of the monuments he had studied in Italy, and aiming unceasingly at being majestic, often only attains heaviness. On the other hand, too much occupied in search of a rational beauty which he attempted to draw from calculation rather than from sentiment (a pernicious process, which is certain to lead one astray), he could not avoid phantasy, and even awkwardness, in his conceptions.

Let it not, however, be understood that De l'Orme is unworthy of the celebrity attached to his name. In the opinion of a most illustrious judge, Jean Goujon, his contemporary, De l'Orme was regarded during his lifetime as an eminent architect,† and indeed as such he will be always considered, whatever may be the variations of taste, because, in addition to his studies on style and form, he has made profound researches into the art of construction, which he was the first to publicly reveal in France.

Great progress realised in technology, that is the most sparkling gem in De l'Orme's crown, and it is on that scientific ground that he truly surpasses all his rivals, and thus acquires an incontestable right to the gratitude of posterity.

THE CAXTON EXHIBITION.

THE exhibition of antiquities and curiosities connected with the art of printing, opened last Saturday (June 30) by Mr. Gladstone, in the presence of a numerous company, is a healthy sign of the lively interest taken by a large class of persons in the history of the art of printing, and as such may be considered a most fitting celebration of the fourth centenary of the introduction of printing into this country.

In fixing upon this year for the anniversary, the committee have been guided by the date of the "Dictes and Sayinges of the Philosophers," the first book we can be certain was printed in England. Although "The Game and Playe of the Chesse" bears the date of 1474 (which according to modern reckoning is 1475), and it is generally assumed that "The Recuyell of the Historyes of Troye," issued without any date, appeared before that year, those two books, acknowledged to be the first in the English language, may have been printed by Caxton at Bruges. The determination

† See *Builder*, vol. xxxiv., p. 871.

* See an epistle, by Jean Goujon, attached to a translation of Vitruvius, by Jehan Martin. Paris, 1577. Folio.

of the committee, consequently, to hold the celebration this year is justified by historical evidence, though it is difficult with our present information to fix the exact date when Caxton introduced the art in England. As regards the early history of the typographical art in this country, we are at present confined to such remarks of Caxton himself as appear in the form of prologues and epilogues to his printed books.

At the outset it may be said that the Caxton committee have been true to their programme, having been greatly assisted in their aim by the authorities at South Kensington Museum, who have placed ample space at their disposal. But the committee would have been unable to achieve so much as they have done had not owners and custodians of rare specimens of printing come forward most generously, and permitted the treasures in their possession to be exhibited. They have lent a willing ear to the request of the committee for loans, and the exhibition, on that account alone, must be pronounced a success. Especially strong is the exhibition in biographical illustrations having especial reference to Caxton.

Beginning with Class A, Printed Books, we notice first those from the press of William Caxton—as many as 151 copies of books printed by Caxton having been contributed—classified under their order of production. They probably represent the greatest number of them ever seen together, having been lent by the Queen, Earl Spencer, the Duke of Devonshire, and others. To these are added the books of Colard Mansion, of Bruges (of whom Caxton acquired the art), books printed in the fifteenth century by Caxton's contemporaries and successors, and books illustrating special developments of the art. Among these are block-books, the Mainz Psalter, valued at 3,000*l.*, the property of the Queen; the Mazarine Bible, and other invaluable early works, in which the exhibition is especially rich.

Class B, Specimens of Printing, especially is one of the most complete, and will probably be one of the greatest attractions of the exhibition. It illustrates the typographical history of the Bible; the series being continued down to the present time, and including all the rarities known, as well as the many editions in all languages of the British and Foreign Bible Society. There are next, in the same class, early specimens of printing from stereotype plates, also of printing by steam (1814); printing in colours from raised blocks; specimens noticeable for beauty and excellence of typography; commercial printing, and newspaper printing.

The latter section is displayed at the Queen's Gate entrance, at the bottom of the staircase, and well deserves a close attention. We find here early specimens of the *Morning Post* (September 20, 1781), No. 88, vol. xiii. of *The Public Register, or Freeman's Journal*, of March 16, 1776; No. xx. of the *Guardian*, April 3, 1713, the *Spectator*, July 31, 1711; the *Tatler*, November 4, 1710; an early number of the *New York Gazetteer* (1775); No. 1,791 of the *Times*, dated Friday, November 5, 1790, in close proximity to its then rival, *The New Times*, which has under its title in brackets "[not connected with the paper called *The Times*]." When the *Times* at the beginning of the year brought out its weekly edition, very few people probably were aware that the idea is not so original after all, for as recently as 1821 there appeared *The Observer of "The Times,"* a Monday edition of the Thunderer, printed especially for country circulation. A copy of the first newspaper ever printed in England, *The Continuation of our Weekly Avisoes*, No. 32, July 6, 1632, may also be seen here; and probably the first technical journal, *The Craftsman, or Say's Weekly Journal*, August 15, 1789.

Mention may at the same time be made of several old books of a germane nature on architecture, &c., exhibited in Room N. There are "Directions to the Surveyors of Highways of the County of Westmorland" (1733); "Dissertation in vindication of the Antiquities of Stone Henge" (1730); "Durham Cathedral," containing, among many other matters, a description of the "Histories painted in the Windows" (1733); and "A Description of the Gardens and Buildings at Kew" (no date).

After this digression, we may return to the order of the catalogue, to Class B B, containing specimens of music-printing, from the printed staff upon which the notes were inserted by hand down to the best productions of the present day.

In Class C, Book Illustrations, it has been found possible to arrange a complete history of wood-engraving, from its appearance in Europe in the fifteenth century down to modern times. In close connexion with this is the art of colour-printing, including that known as chiaroscuro. Printing in colours was first introduced in the sixteenth century, and it has now reached a perfection amply illustrated in the specimens exhibited.

In Class D, ancient and modern type and other printing materials are shown. This mechanical display of the art of printing is perhaps one of the most interesting features of the whole exhibition. There are three old wooden presses, in a fair state of preservation, one of which is being worked in the old laborious style with balls, worked by perhaps the most antique-looking pressman it has ever been our fortune to behold. The man in himself is a study. Close by is a compositor's case, filled with a fount of Caxton's smallest type; only the ancient compositor is wanting to complete the picture. The display of these by the side of the appliances of modern printing, several very noisy machines being kept in motion,—much to the annoyance, no doubt, of exhibitors of composing and other ingenious machines, who have almost to shout at the top of their voices to make themselves understood by curious inquirers—is an instructive illustration of the vast stride since the days of Gutenberg and Caxton. To the great comfort of visitors, stereotyping and electrotyping are carried on in an out-house. It would be well to relegate the type-casting machine exhibited to the same region.

Under Class F, copperplate printing, lithography, and photography are shown. An awkward-looking, cumbersome litho-press is being worked by a printer of the old school, not much in love with the modern litho-machine, close by, also in motion. The art of lithography, invented by Theobald Senefelder, of Germany, of whom a good portrait is exhibited, was first introduced in this country in 1801, under the name of polyautography, by the Brothers André, and their successor, Vollweiler.

Antique printing and writing papers, with water-marks, form Class G.

Class H includes portraits of printers and celebrated authors. It is only right to draw here especial attention to a work of art, demonstrating in a marked manner what patience and skill are able to achieve, but showing at the same time how little those qualities are appreciated, unless applied with judgment. It is a portrait of Gutenberg, set up in movable type, each type having on its face a number of dots of all sizes, by means of which the laborious workman,—or, rather, artist,—is able to express all the various shades necessary for the delineation of the features. The effect is most surprising. Herr Carl Fasol is the painstaking compositor who has thus successfully overcome the angular difficulties of types, but, we believe, has never been recompensed for his labour. He visited this country several years ago, trying to sell his pictures, but soon left it again, disappointed.

Having thus briefly touched upon the principal features of an exhibition which is creditable to the gentlemen who have undertaken its management, we are forced to refer to a serious mistake, possibly unintentional, committed in its organisation. On looking down the list of names forming the committee, the entire absence of the working printer's element in that body cannot escape attention. This omission may, perhaps, appear trifling when the success of the celebration will come to be counted up, but it is somewhat in contradiction with the avowed object of the exhibition that the important factor,—the toiling printer,—should have thus been entirely overlooked, not to say unceremoniously elbowed out. This is all the more unfortunate as the benefit which it is hoped will be derived from the exhibition for the Printers' Pension Fund will in a great measure depend on the aid given to it by the trade. It is just possible that the neglect experienced at the hands of their betters by the printers will be resented, a feeling of apathy may take the place of any small interest that may have been felt in the matter, and an important object of the exhibition, an increase in the funds of the Printers' Pension Corporation, may suffer by it.

It is to be hoped that those fears may be falsified by the result of the exhibition, and that the printers will look over the slight thus put upon them. For our own part, we will at present do no more than echo the words pronounced by Mr. Gladstone,—"The exhibition is open. May it prosper!"

ST. AGNES, KENNINGTON PARK.

THE church we have illustrated was consecrated at the beginning of the year by the Lord Bishop of London. The group of buildings of which it forms part occupies a very advantageous position, fronting the central avenues of Kennington Park. The site has frontages towards the Farmer's-road, and the street now in progress to be named Kennington Park Gardens. The western frontage, facing the park, is occupied by the vicarage-house.

Immediately behind the vicarage rises the west front of the church. A spacious arched passage through the house gives a view of the great west doorway of the church, and affords an approach to it, suitable for use upon occasions of ceremony. The church itself is capable of seating 1,200 persons, and it has been erected at a cost of about 13,000*l.* (exclusive of the sum paid for the site; the east window, which cost 1,000*l.*; and the font, altar, bell, heating apparatus, chairs, kneelers, &c., provided at an additional expense, in all, of about 400*l.*). Its internal length is about 140 ft., and its clear breadth, 63 ft. The aisle walls are 32 ft. in height, and the nave walls, 50 ft. The nave ceiling, which is boarded and painted, rises to a height of 65 ft. above the floor, and the external ridge is about 75 ft. above the pavement. The chancel roof is of the same height. The clear width of the nave is 24 ft. 6 in. Following the contour of the site, the chancel is deflected several feet to the south of the central line of the nave, as in many ancient churches. The aisles are continued almost to the east end of the chancel, but narrow transepts mark the separation of the nave and the choir. The main roof is continuous from end to end externally; a stone bell-cot rises from it over the chancel arch.

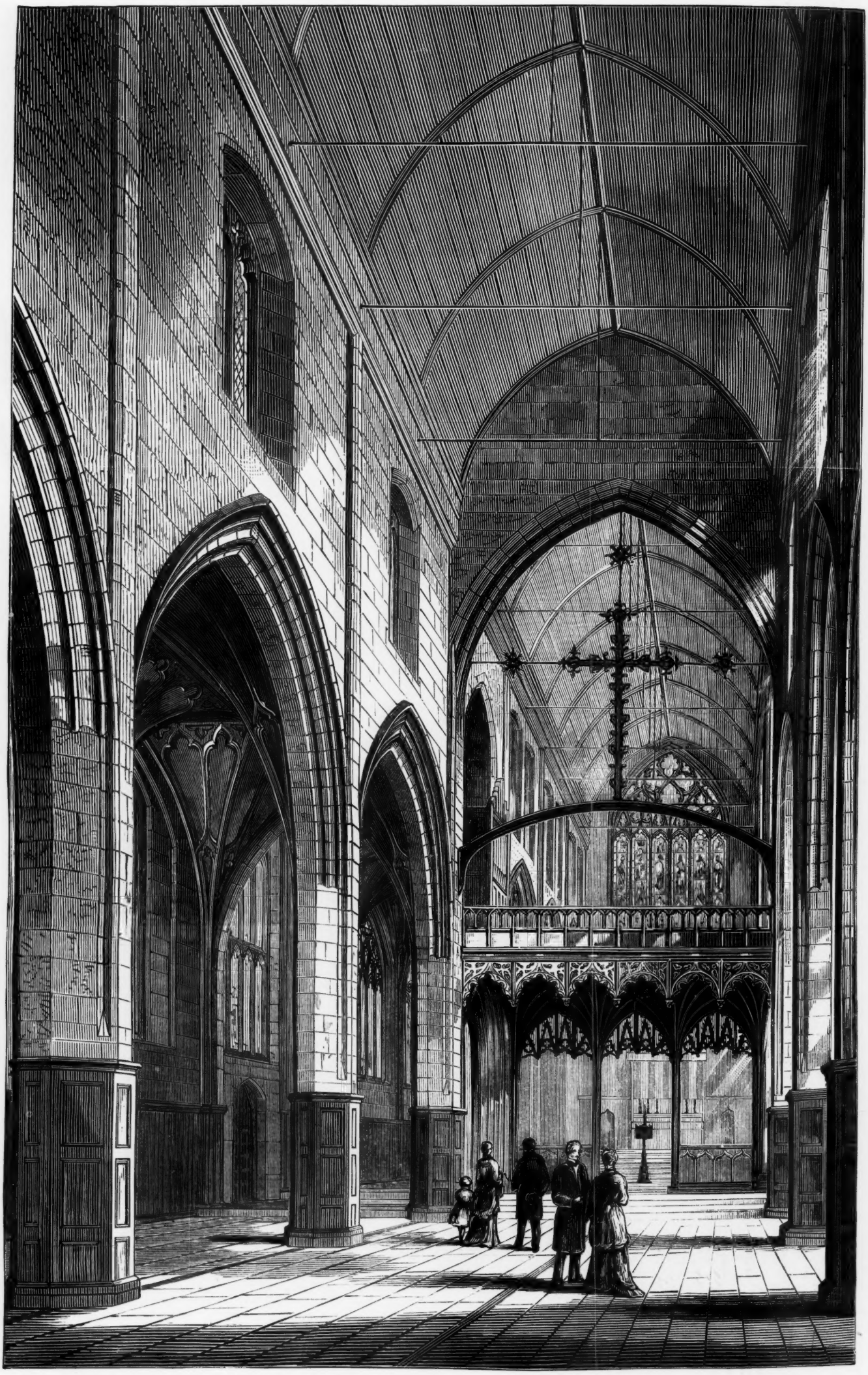
The church depends for effect upon its proportions and large dimensions, and not upon delicate details. The materials are red brick from Suffolk and Hampshire, with Bath stone dressings. The aisle roofs are covered with zinc, the main roof with Staffordshire tiles. Internally, the effect is that of spaciousness and height. The walls are plastered. It is intended to build at the west end a stone gallery, the centre pillar of which is to be carried up to support wooden groining, above the heads of the two lofty west windows, above which will be placed the bell-chamber. This gallery will increase the accommodation by about 200 sittings.

The style of building is English Middle Pointed of the fourteenth century, and the traceries of the windows form a principal ornament of the interior. The east end is occupied by a lofty window of six lights. This is filled with stained glass, designed to illustrate the doctrines of the Incarnation and of the Atonement. It has been executed by Mr. C. E. Kempe, of Beaumont-street, Cavendish-square, and forms a memorial of a lady, now deceased, who has been the principal benefactress of the church.

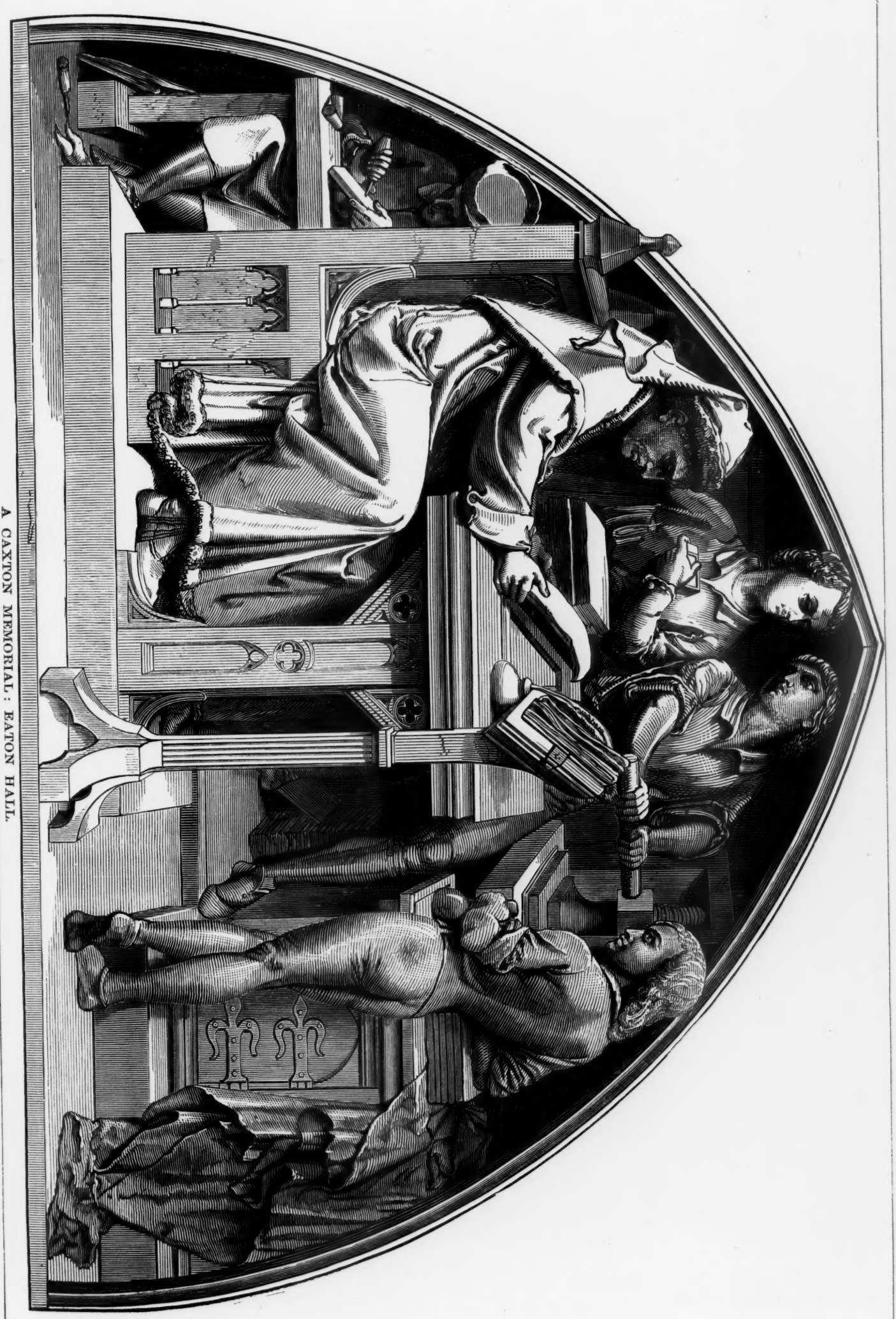
The altar-table stands in advance of the east end, against a screen wall which is pierced by two small doorways; behind this wall is a passage which connects the clergy and choir vestries.

The chancel is separated from the nave by an open screen of which only the constructional portion (upon which the decorative detail is to be built up) is at present erected. Across the top of the screen runs the organ-loft. The organ (the case of which is merely temporary) occupies the north end of this gallery, standing under the arch which opens into the north transept. A similar arch upon the south side may be made use of hereafter for an extension of the instrument, the trackers being carried under the floor of the organ-gallery. The loft itself is to afford convenient space for an orchestra when required.

The walls and pillars of the nave are covered to a height of 8 ft. by wooden panelling, the decoration of which is not yet completed. This treatment will add to the comfort of the congregation. The floor is laid with Portland cement divided into panels by narrow bands of stone, and chairs are used throughout. The warming is by hot-water coils placed above the floor against the side walls, no floor gratings whatever being used. It has been carried out by Messrs. Berry, of Regent-street, Westminster, who have also executed the gaswork. The font stands in the centre of the western part of the church upon steps of red Mansfield stone. In addition to three large entrances placed at this end of the church, doors are provided in each



THE CHURCH OF ST. AGNES, KENNINGTON PARK.—MR. G. GILBERT SCOTT, JUN., ARCHITECT.



A CAXTON MEMORIAL: EATON HALL.

transept for exit in case of any emergency. The whole of the sittings are free and unappropriated.

To the east of the church are the schools, forming part of the group. They will accommodate 360 children, and have been erected at a cost of 3,076*l.* This is at the rate, excluding the purchase of the site, of about 8*l.* 11s. per child.

The foundations of the church were put in by Messrs. Dove, of Islington. The schools and carcass of the church have been carried out by Messrs. Niblett, of Holloway; the finishing of the church and the vicarage-house by Messrs. Hill, Higgs, & Hill, of South Lambeth. Messrs. Holden, of Wood-street, Westminster, have executed the zinc work; and the organ is by Messrs. Walker, of Francis-street, Tottenham Court-road. Mr. Kaberry has acted as clerk of the works throughout.

The architect is Mr. G. Gilbert Scott, jun., F.S.A., of Duke-street, Portland-place.

A CAXTON MEMORIAL.

THE accompanying engraving represents Caxton sitting at his printing-press, Westminster, in the act of printing "The Game and Playe of the Chesse," an illustrated book published in 1474 with solid type blocks. The details are taken from a cut in Wynkyn de Worde's work. This engraving is from a panel of sculpture executed by Messrs. Farmer & Brindley for his Grace the Duke of Westminster, for the door-head of the new library at Eaton Hall, now being executed from the designs of Mr. Alfred Waterhouse.

INTERESTING ENGINEERING EVIDENCE ON THE THAMES PREVENTION OF FLOODS BILL.

THE evidence given by several engineers of eminence on the Thames River (Prevention of Floods) Bill, which was under investigation before the Parliamentary Committee for nine days, and which has just been withdrawn by the Metropolitan Board of Works for the present in consequence of the decision as to the payment of the cost of the proposed works, is of a highly interesting character, when viewed from a scientific point, and as bearing upon tidal action in the Thames, in connexion with the Victoria and the two other embankments.

Sir Joseph Bazalgette, engineer to the Metropolitan Board, was three days under examination, in the course of which he gave some remarkable facts in connexion with extraordinary high tides which had taken place in the Thames so far back as nearly 800 years ago. In the year 1099 there was a very high tide, when the river banks overflowed. In 1235 the tide rose so high at Westminster that the lawyers were brought out of the Hall in boats. In 1238 Westminster Palace was flooded. In 1242 the banks burst, and the country was under water for six miles. In 1555 Westminster Hall was again flooded. In 1663 was recorded the greatest tide that was ever then remembered in England, all Whitehall having been drowned; and taking the levels of the lowest parts of Whitehall, this appears to have been 3 ft. to 4 ft. above Trinity standard. In 1732 a high tide overflowed Wapping and Tooley-street. In 1762 the tide flowed into Westminster Hall, covering the floor to the depth of 4 ft. Subsequently there were various high tides until they came to 1791, when a high flood overflowed the banks above Westminster Bridge. In Palace-yard it was 2 ft. deep. The *Star* newspaper of the 3rd of February, 1791, recorded that "boats came through the passage of Old Palace-yard from the Thames, and round up to Westminster Hall gate. The two Scotland Yards, Privy-gardens, Whitehall, were under water, and many parts rendered impassable for two hours. Westminster Hall suffered much; the water ran in at the great door for upwards of an hour, and was up to the second step leading to the Court of King's Bench." On the 28th of December, 1821, a high spring tide flowed over the banks and wharfs between Westminster and Chelsea Hospital, causing great destruction of property. In Millbank the water was so high that it ran in at the carriage-doors of such vehicles as persisted in passing that way, and boats were used, passing to and fro, and carrying the inhabitants to and from their homes. Near Vauxhall Bridge it burst the bank, and the water dashed along with a cataract fury and overwhelming quantity, laying under water the market-gardens and fields, and the lower portions of the houses in the district. In all he had a record of between sixty and seventy extraordinary high tides. In January, 1850, the tide rose to 3·66 above Trinity high-water level. In November, 1852, it rose to 3·75; in 1854 to 3½ above Trinity. Then, in 1863, it rose to 3·17. In February, 1868, it rose to 3·58, and in March, 1869, to a similar height. On the 20th of March, 1874, it rose to 4·25. On the 15th of November, 1875, it rose to 4·54, which was the highest tide on record; and on the 2nd of January last it rose to 4·12; and on four occasions since it had risen over 3 ft. above Trinity high-water mark. It therefore appeared that, extending from the year 1099 up to January of the present year, the low districts abutting upon the Thames had periodically been subject to a flooding caused by an overflow. The next points upon which Sir Joseph was examined were the completion of the intercepting main-drainage system, and the effect of the three embankments on the tides. With respect to the first point, he stated that by the year 1866 the Metropolitan Board had completed their intercepting main-drainage system, and the effect of that as regarded the river Thames was that a very large body of sewage-water which formerly flowed into the Thames above London, amounting to 607,000 tons per diem, was diverted to a point below London, and discharged upon the ebbing tide, so that to this extent the tendency to flooding was reduced by those works. That amount of sewage-water which formerly came into the Thames above London was larger in volume than the amount of water which formerly found position on the sites of the three embankments which had been executed by the Metropolitan Board. Taking the total area of the embankments up to the height of Trinity high-water mark, and reducing it to tons, it would be 587,000, or somewhat less than the quantity removed from the upper reaches of the Thames by the Metropolitan Main Drainage, and pumped into the Thames at a lower point. The total area which had been reclaimed by the three embankments was fifty-one acres, viz., thirty-five acres by the Victoria Embankment, seven acres by the Albert Embankment, and nine acres by the Chelsea Embankment. During the last few years there had been a gradual rising and a gradual depression of the tides within the metropolitan area, but that rising and depression could not be in any way attributable to the construction of the Thames embankments. The momentum of the tidal wave was checked by the friction of the river-bed, by obstructions placed across the river, and by the laws of gravity, and removing any one of those obstructions would cause a greater volume of tide to pass up the river. He was of opinion that the removal of old London Bridge, old Blackfriars Bridge, and old Westminster Bridge, all of which were obstructions, had caused a very much larger volume of tidal water to pass up the river than passed up formerly. He did not think that the effect of the construction of the embankments had been to introduce a new obstruction to the tidal range. The prevalent idea seemed to have been that the embankments, by narrowing the channel, pushed over the water, or something of that kind, to the south side, but that could not be so, because taking that view of it, supposing it were possible that it could be pushed over in that way, by being put into a narrower space, it would be found that at Southwark Bridge, at the present time, which was below the Victoria Embankment, there was only a waterway of 14,200 superficial feet, whereas opposite to the Embankment, which was at a higher point than Southwark Bridge, that tide which had passed through an area of 14,000 ft., had there to expand itself into areas varying from 19,000 ft. to 20,000 ft., taking the narrowest to the widest point. The examination of the witness was next directed to the remedies against future floodings, when he stated that they lay in the raising of the walls of the different wharfs and river frontages by the owners and different parishes, which was a simple matter. Several owners had already done the work, including the London and South Western Railway Company, the London and Brighton Company, and others; and he was informed that the Admiralty proposed to raise the Royal Victualling Yard at Deptford to a proper height, and also that the Corporation intended to do the same thing as to the Foreign Cattle Market. Bearing in mind the inundations, and the remedy which he had suggested to provide against them in future, he was of opinion that such a Bill as that before the Committee should be passed.

The witness was examined at great length be no less than nine counsel, and here it may by stated that there were no fewer than sixteen petitions against the Bill, including eight from the vestries and district boards of works; also from the Millwall Dock Company, the Surrey Commercial Dock Company, the London and St. Katharine's Dock Company, the Conservators of the Thames, and several private firms. Fourteen of the petitioners were represented by counsel, and altogether twenty counsel were engaged in the case, in addition to fourteen agents. The opposition to the Bill was upon the double grounds that the embankments had contributed to the flooding, and that the cost of works to prevent further inundations ought not to fall upon the parishes and individuals, but on the metropolis generally.

In the course of his cross-examination by the various counsel, Sir Joseph Bazalgette denied that the Thames Embankments had had the effect of raising the tides. They had increased the velocity of the stream, but had decreased the volume of water. When he designed the Victoria Embankment it was done in view of past experience as to tides. The embankment was constructed at such a level as was considered necessary to keep out the tides, but since it had been completed recent experience of tides had shown that they rose higher, and subjected the district to more risk of flooding than they had reason to expect. The Victoria Embankment cost 1,249,619*l.*; the Albert Embankment 1,020,000*l.*; and the Chelsea Embankment 33,000*l.*, out of which several sums there was to be a return for lands let. He thought it was perfectly fair that the owners of wharfs should pay for the requisite works. The wharfingers obtained special advantages by being on the banks of the river. No doubt there were many persons living behind the wharfingers who would benefit by the construction of the works necessary to stop the floods. He had suggested three schemes to the Metropolitan Board of Works, one being the construction of a long embankment, which would cost 4,000,000*l.* or 5,000,000*l.*; another being a system of embankment which would cost only a tenth of that sum; and the third being a system of patch-work, which would be effectual, but somewhat unsightly.

Mr. Henry Law, C.E., Memb. Inst. C.E., was next examined, and stated that his acquaintance with the river Thames commenced in 1837, when he became a pupil of Sir Mark Isambard Brunel, and assisted in the formation of the Thames Tunnel, of which he was subsequently one of the assistant engineers. In the years 1843, 1844 and 1845 he was engaged, under the directions of the late Mr. Thomas Page, in taking soundings of the river, and under Mr. Page's direction he prepared and made the surveys for the first Thames Embankment prepared by the Metropolitan Improvement Commissioners, who sat in connexion with the Woods and Forests. He also prepared the designs for the Chelsea Suspension Bridge, and the new bridge at Westminster, under Mr. Page's direction. Nearly the whole of his time had been spent upon works in connexion with the river Thames. He considered that the causes of flooding in the Thames were produced, first, by the friction of the bed having decreased; also by local obstructions having been removed; by vessels which formerly lay between Deptford and London Bridge having been taken away; by the increased amount of upland water sent down, and by the improvement of the drainage of the valley of the Thames. In his opinion the Thames Embankment had certainly not in any way contributed to the overflow of the river, nor had the substitution of solid ground for water, in the case of Victoria, Albert, and Chelsea Embankments, produced that result. The effect of the construction of the Embankment had not been to deflect the tidal current to the opposite side of the river. A stream always endeavoured to run in a straight line, and if the river bends it keeps impinging against the concave side in its efforts to produce a straight line; it always flows along the concave side of the river. Before the embankment was made the wharfs projected, and barges occupied the space, both of which did tend to deflect the water into the middle of the stream; but now that a smooth wall had been put in, the stream ran along the smooth wall, and there could be no influence tending to deflect it across. Direct calculation showed that the effect of the construction of the Thames Embankment had been to reduce the level of the water both above and below the

embanked portion. He had come to the conclusion that without some such power as the Bill contemplated it would be impossible to compel the whole of the wharfingers and owners of property to raise their banks, and that if at certain points there were defaulters, the work done by the others would be very much vitiated, and the good effect resulting diminished. He thought the construction of a general and uniform embankment to effect the objects contemplated by the Bill simply impossible, considering the conditions of the river and the purpose it now served as a great highway for the commerce of the port. The carrying out of such an embankment would take away all the waterside premises and convert them into a roadway, they could not be used for the purposes of trade, because a road would intervene between the river and the warehouses. It would destroy all the trade interests in the Port of London, and the amount of compensation to be paid alone would make it quite prohibitory.

In cross-examination by Mr. Bidder, Q.C., the witness stated that it might be or might not be just to cast upon an individual the necessity and cost of executing protective works upon his own property for the improvement of the metropolis generally. It must depend entirely upon the proportionate good which he, in common with all the rest of the metropolis, would derive from a public improvement, and the particular injury he sustained.

Mr. James Abernethy, C.E., and at present a vice-president of the Institution of Civil Engineers, was next examined, and stated that for thirty years past he had had great experience in the regulation of tidal waters, and had for a long period been acquainted with the River Thames. He agreed with the last two witnesses as to the causes which had increased floods in the Thames, namely, the removal of obstructions from the bed of the river. These causes were all entirely independent of any embankment that had been made. The effects of the embankment would not at all add to those causes. Setting aside scientific questions as to the increase of floods, he would simply point out one or two facts. The high tide which occurred in June, 1875, rose 4 ft. 6 in. at the entrance to the Millwall Docks, and although no embankment similar to the Thames Embankment existed at that part of the river, the tide rose over the quays of that dock, and that had necessitated the raising of the quays to the height of 15 in. above the original level, that dock being between three and four miles below the Thames embankments. Again, at the Victoria Dock, below Blackwall, or eight miles below the embankments, the tide also rose above the level of the quay of the outer basin, and inundated the adjoining buildings and lands, and they had also been obliged to raise the level of their quays at that point from 18 in. to 2 ft. All that tended to show that the increased level of the Thames was general, and not confined to the section occupied by the Thames embankments. There was a general cause, followed by a general effect. The vertical walls of the embankments were no cause for increasing the flooding. The effect of these vertical walls had been to increase the hydraulic mean depth, and to give an acceleration to the current, but inasmuch as the area had been lessened the increased velocity of the current, due to the diminished area, did not pass such a quantity of water into the upper reaches of the river as passed up the channel previously to the Thames Embankment being formed, when the velocity was less and the sectional area more.

Mr. William Henry Barlow, C.E., and vice-president of the Institution of Civil Engineers, was next called, and said that his special experience of the Thames dated back to 1830. He also agreed with the other scientific witnesses that the removal of such important obstructions as the old London, Blackfriars, and Westminster bridges had been to give a much greater impetus to the tidal way up the river. In the case of the Thames he had had a very ancient acquaintance with it. He accompanied his father upon the occasion of the experiment made for the removal of old London Bridge, having regard to the possible effects of its removal. He agreed with the views previously expressed, that the effect of the construction of the main drainage system had been to abstract a larger quantity of water discharged at another point than had been absorbed by the formation of the three embankments. The increased level in the height of the tide which had taken place since the formation of the embankments was not confined to the particular section of the river where the embankments existed. He had noticed the effect of the floods throughout the whole distance from Fulham to Woolwich, which would be eight miles below the lowest point of the Thames Embankment, and bearing in mind those distances, the construction of the embankment could have had nothing to do with the raising the level of the river at those points. He did not consider that the causes which had contributed to produce flooding in the metropolis had come to an end. As improvements in drainage and other works were carried on in the upland districts, he had not the slightest doubt that the severity of floods would increase.

In consequence of the Parliamentary committee having passed a resolution to the effect that the Metropolitan Board of Works ought to carry out the necessary works at the cost of the Metropolitan Board's area, no further scientific evidence was taken on either side, and the Bill is withdrawn for the session.

THE ROYAL FUNERAL EFFIGIES IN WESTMINSTER ABBEY.

THERE is still a nook in Westminster Abbey which is not thrown open to the public, and is, consequently, but little known, though it contains relics of exceeding interest. We allude to the small chantry, or upper chapel, in which are now preserved the wax and wooden effigies of several of our kings and queens that have been used in the royal funerals in former ages. The sight-seers of the present day are not aware of the existence of these memorials, though country visitors to London, in old times, placed them in the same rank of wonders as that they assigned to the lions in the Tower. Goldsmith's Chinese philosopher alluded to them vaguely when he wrote, referring to an iron gate in the sacred edifice where threepence were demanded of him,—"I expected, upon paying here, to see something extraordinary, since what I had seen for nothing filled me with so much surprise. But in this I was disappointed: there was little more within than black coffins, rusty armour, tattered standards, and some few slovenly figures in wax." These figures are now, as we have indicated, separated from this companionship, and placed in their glass cases and cupboards in Abbot Islip's chantry. This chapel is in the north aisle of the choir. It is approached by a low door, which gives access to a winding stair that leads up to it.

One side of the chantry [consists of open arches, from which the abbey can be viewed. The cases are ranged round the four sides, however, and one, raised on a stand, containing an effigy of the Duke of Buckingham, occupies the centre of the floor. As we enter, we stand before the effigy of Queen Anne. A cloud of remembrances come to mind as we gaze upon the kindly pale face and somewhat homely form, set out with its brocaded silk robes, and pearl ornaments. We know that this is the figure that lay upon the funeral car of the royal lady, and that the dress is such as she was known to wear, and would be recognised as part of her presentment by the silent crowds that gazed upon the solemn procession; the same, too, that her numerous little children, all lying in a vault close by, would have recognised had they lived to grow to the age of recognition. We cannot look upon it with the same immovability as did the Chinese philosopher. We think of the Augustan age over which she presided, her friendships, her tenderness, her bounty, with peculiar interest, and turn from it with lingering regret.

Close by is the effigy of Queen Elizabeth. It does not represent the beautiful being we might picture as the "fair vestal throned in the west," but the aged lady she became at the close of her long reign, wrinkled and thin, dressed too in brocaded silk, with jewels round her withered neck, and with rosettes on her high-heeled shoes; again, we may be sure, the veritable image of the presence to which her loving lords and commons knelt. Surely, we have few personal relics, in the land, of greater interest.

Effigies of the Duchess of Buckingham and her son are also preserved here, dressed as magnificently as the royal ladies, mute evidences of the consideration enjoyed by them. Standing near the recumbent effigy of the Duke of Buckingham is the effigy of King Charles II. It is erect and life-like; more dusty, perhaps, than the rest, but enabling us to realise exactly and vividly the popular monarch as he walked about St. James's Park feeding the ducks at the decoy or sauntered down the Mall, or round Rosamond's Pond. "No kind of danger, James," he might be saying, "no kind of danger, James, for I am sure no man in England will take away my life to make you king."

Near to King Charles is a figure representing Nelson, somewhat short of stature, sunburnt, and in a naval uniform. It appears that the abbey was comparatively deserted by sightseers after the burial of this hero in St. Paul's, and to attract them back again, the officials caused this figure to be made and dressed in clothes that he had worn. This is the only figure belonging to this century.

In a closet, by the side of the case that contains the effigy of Queen Anne, are placed several unidentified figures made of wood, stripped, for the most part, of their coverings, though in two or more instances still possessing a fragment of the garments with which they were originally clothed. In one of these instances the fragment in question, however, is but an indication of a gilded crown. It has been suggested that this effigy may have represented Queen Philippa, and a slight research may possibly establish this supposition as a fact, though it is believed that effigies were first used at the burial of Henry V. Previously, the kings themselves were shown to the people in their royal attire; but as that monarch died at Vincennes, this custom was necessarily abandoned, and on the arrival of the procession that accompanied his remains from Paris, an effigy was placed on the funeral car, which was followed by his three chargers up to the altar. This effigy is, probably, among the little gathering thus unceremoniously stowed away. The absence of finish to the features of those that are visible in the dusk of their recess suggests that the faces may have been once covered with wax like those in the excellent preservation we have mentioned.

Altogether the collection has a singular charm. It brings the past before us as vividly as any enchantment could do, and with greater reality, for these figures, we know, belong to their own time, and were robed in their own time, and are no counterfeits as far as costumes and accessories are concerned. In the lifetime of the originals, we call to mind, the abbey was but a speck on the vastness of their possessions, and now these semblances are but specks on the vastness of the abbey, occupying, indeed, but a small portion of the space dedicated to one of its abbots, but still worthy that some account should be taken of them, and care exercised that their condition should not suffer from neglect.

THE GENTILI MEMORIAL.

A GATHERING is about to be held in the Church of St. Helen, Bishopsgate, of persons interested in International Law, for the purpose of unveiling a mural monument recently placed in that church in memory of Alberico Gentili, whose claim to be at least one of the founders of the science is coming now to be generally admitted. Attention was recalled to the life and writings of this remarkable man by an inaugural lecture delivered in 1874 by Dr. Holland, professor of International Law at Oxford; and committees were soon afterwards formed to do honour to the great Italian, not only in his own country, but also in Holland and in England. The English committee, of which H.R.H. Prince Leopold is president; the Right Hon. Sir Robert Phillimore, D.C.L., Judge of the Court of Admiralty, chairman; and Signor V. de Tivoli, honorary secretary, determined a year ago to commemorate Gentili by placing a monument in the church where he was buried, and by procuring the publication at Oxford, and under the editorship of Professor Holland, of the principal work of Gentili, the "De Jure Belli."

Alberico Gentili was born at San Ginesio in the year 1550, and graduated D.C.L. at the University of Perugia. Obliged to fly from his own country on account of his Protestant opinions, he arrived, in 1579, in England, where his profound legal knowledge procured for him the notice of the great and learned in London, and at Oxford, where he became, in 1587, Regius Professor of Civil Law. In the following year he began the publication of the "De Jure Belli." In 1608 he died in London, and was buried in the churchyard of St. Helen's, at a spot now covered by the buildings of St. Helen's-place.

The monument stands next to the altar-tomb of Sir Thomas Gresham, at the eastern end of the wall of the nuns' choir, where space for it

has been freely and handsomely accorded by the rector of the "Westminster Abbey of the City of London."

It is chiefly of veined and coloured alabaster and black marble, and is partly an imitation of a smaller one now in the chancel of the church, to the memory of Sir William Pickering and his son, in the Palladian style, which was new in England at the date of its erection in 1574 This style, which is also that of many other monuments of about the same date at St. Helen's, is thus suitable to the nationality of Gentili, and to the epoch of his decease. The heraldry consists of the shields of the ancient and honourable family of Gentili, of the town of San Genesio, and of the Universities of Perugia and Oxford. The inscription, in Latin, was, for the most part, composed soon after the death of Gentili as an epitaph, and may, indeed, have been actually placed upon the slab which covered the grave, of which, however, all trace has long been lost. The concluding lines were added by Sir Robert Phillimore.

The appearance of the monument is pleasing, from the combination of the materials,—coloured alabaster, black marble, and rosso-antico. Their effect is heightened by the gilding and emblazonry.

The whole work reflects great credit upon the well-known sculptors, Messrs. Henry Poole & Sons, of Millbank, Westminster.

THE LATE MR. R. L. ROUMIEU, ARCHITECT.

On the 28th ult., at The Cedars, Harrow Weald, the residence of his brother-in-law, died Mr. Robert Lewis Roumieu, of 10, Lancaster-place, Strand, and 7, St. George's-terrace, Regent's Park, aged sixty-two. So runs an announcement which we have read with much regret. Mr. Roumieu was a pupil of the late Benjamin Wyatt, and has steadily pursued his profession for a number of years, for a time in partnership, but mostly in his own name alone. His works have been numerous. They comprise:—restoration and additions to "Franks," Kent; restoration of Kensworth Church, Herts; St. Mark's Church and Parsonage, Tunbridge Wells; Manor Park Estate, Streatham; Victoria Ironworks, Isle of Dogs; the French Hospital, Victoria Park; St. Michael's Church, Islington; the Prudential Assurance Office, Ludgate-hill; Chambers, 10, Old Broad-street; Victoria Wharf, Upper Thames-street; Messrs. Woodall's Carriage Factory, Orchard-street; East St. Pancras Schools; Boarshead Chambers, 34, Eastcheap; additions to Brookshill Harrow Weald; additions to Itchel Manor House, Itchel, Hants; 48 and 49, Cheapside; additions to Whitbourne Hall, near Worcester; "The Lymes," Stanmore, Middlesex; "The Cedars," Harrow Weald, Middlesex; additions to "The Priory" (Sir James Knight Bruce) Roehampton; and "The Priory," Wimbledon. Mr. Roumieu also built several warehouses for Messrs. Crosse & Blackwell, and also stables for the same firm in Crown-street, Soho; and had in course of erection a warehouse for them in Crown-street; and a warehouse for Messrs. Petty, Wood, & Co., Southwark Bridge-road, Southwark. The stables in Crown-street, and other of his works, have been illustrated in our pages. We may add that Mr. Roumieu was surveyor to the Gas Light and Coke Company's Estate at Beckton; the French Hospital Estate, St. Luke's; and several other estates in and near London.

His son, Mr. Reginald St. Aubyn Roumieu succeeds him, and has our good wishes for a prosperous career.

AIREDALE COLLEGE, BRADFORD.

The new Airedale College for the training of Independent ministers was formally opened on the 20th ult. The foundation-stone of the building was laid in October, 1874, and the structure was completed, so far as to admit of collegiate duties being undertaken, in September last. Since that time the furnishing of the college has been carried forward and completed. The site has been well chosen. Standing well up above the Shipley Valley, the college and its grounds are protected in great measure from the strong westerly winds which so freely played upon the old building at Undercliffe. The site has also another advantage, inasmuch as the building has a direct outlook upon the richly-wooded slopes of Lister Park. About six acres were purchased, at a cost of about 9,000*l.*; but it is intended to dispose of nearly one-half of the land fronting to Emma-lane as sites for villa residences. The principal front of the college is to the south, or towards Lister Park, the extent of the façade being about 200 ft. The style is Geometrical Gothic. Entering by the principal doorway, which is in the centre of the building, and is surmounted by an oriel window, the visitor is admitted to the vestibule, which is divided from the hall by an oak screen and folding-doors. The hall is spacious, and crossed by corridors right and left, while the grand staircase is thrown well to the rear of the hall. Occupying the eastern end of the building, and approached by the right corridor, is the assembly-room, 60 ft. by 30 ft., with an extreme height of nearly 80 ft. This room is lighted by a large oriel window in the south front, several two-light windows on the east, and a rose-window in the northern gable. The Principal's residence, although immediately connected with the College, has separate entrances, and some distinctness is also given to this part of the building in its architectural treatment. The house is surmounted by a tower, with ornamental iron cresting and finials. Class-rooms, council-room, library, and numerous other apartments are provided.

The floors, doors, and casings are of pitch pine, which has been extensively used throughout, and has generally been well selected. The fittings and furniture have been supplied by Messrs. Mills & Co., Bradford. The decorative work is of the simplest character, the prevailing colours used being a neutral tint approaching to grey green for the upper portions of the walls, with dados of Pompeian red. The painter and decorator was Mr. E. Harland, of Bradford. Ventilation is secured by independent shafts, conducting the foul air through brass gratings in the walls, and the heating is effected by Haden's combined hot-air and water apparatus. The laying out of the College grounds has been done by Mr. T. Clough. The principal contractors for the building were Messrs. Murgatroyd, masons, Idle; Messrs. W. & J. Beanland, joiners, Bradford; Mr. Rushworth, plumber, Shipley; Mr. B. Dixon, plasterer, Bradford; Mr. R. Hird, iron-founder, Shipley; and Mr. Smithies, slater, Bradford. Messrs. Lockwood & Mawson, of Bradford, were the architects. The cost of the building, the furnishing, the laying out of the grounds, &c., is stated at 18,000*l.*

NATIONAL TRAINING SCHOOL OF COOKERY.

The annual meeting in connexion with the above school was held on Monday afternoon, at the school, in Exhibition-road, South Kensington, under the presidency of the Duke of Westminster. The Report of the executive Committee stated that the school had now become self-supporting, the donations being only 62*l.* 11*s.* Her Majesty's Commissioners for 1851 had kindly advanced 500*l.* to the school without interest. With the aid of this sum, the fees for local teaching, and, with reduced expenditure, the debts of the school had all been paid off, and there was a working balance at the banker's. The schemes for the gradual spread of the teaching, as well as the better training of teachers, would be supported by the Committee, as they were aware that these points must be well attended to if the school was to maintain its place in the estimation of the public. The receipts for the years ending the 31st day of March, 1875, 1876, and 1877 were 2,671*l.* 5*s.*, 3,018*l.* 9*s.*, and 3,698*l.* 7*s.* respectively; and the payments were 2,479*l.* 18*s.* in 1875, 3,292*l.* in 1876, and 3,010*l.* in 1877. The noble president, in opening the proceedings, said the financial position of the association, as shown in the report, was satisfactory.

The Hon. F. Leveson-Gower, M.P., the chairman of the Executive Committee, in moving the adoption of the report, referred to the great advantages of the Association.

Sir Daniel Cooper, the treasurer, seconded the adoption of the report, which was carried unanimously.

A vote of thanks to the chairman, on the motion of Sir Henry Cole, was carried by acclamation.

Mr. Godwin, from the body of the meeting, called attention to the want of proper arrangements for the comfort of the ladies who attended the classes; and it was stated on the part of the Council that the subject should not be lost sight of.

CONFERENCE ON TRADE UNIONISM.

On Saturday afternoon last a conference on "Trade Unions and the Church," was held at the Chapter-house, St. Paul's Cathedral, in continuation of a series of conferences that have taken place between clergymen and members of trade unions and others, with the ostensible object of enabling the clergy to act as mediators in trade disputes or otherwise. The Rev. J. Oakley, of St. Saviour's, Hoxton, presided. The subjects indicated for discussion were "The objections and difficulties of employers in dealing with trade unions; especially the practice of unionist workmen striking against non-unionist workmen, the alleged deterioration of work, and the emigration of English trade, considered as due to trade conflicts, and the alleged restraint of individual liberty. A system of arbitration and conciliation, considered as an end to which all efforts for the organisation of labour shall tend. Co-operation considered as a solution of the labour question."

The Chairman, in opening the proceedings, alluded to the prejudice existing when it was thought that the clergy were apathetic in such matters, or sympathised rather with the employer than with the employed—with the rich rather than the poor. The desire to take up a right attitude was the main motive of the conference, and to learn from both sides the exact state of affairs was the secondary motive.

Mr. Doulton then opened the discussion, as an employer of labour. He commenced by stating that those who came forward to interfere generally ignored the laws of political economy, and were disposed to look at the mere sentimental side of the question. He inclined to the belief that the rise in wages was due much more to natural causes than to trade-unions; and in saying this he was not saying one word against them. Referring to the great prevalence of strikes in the "Black Country" and in other places, he said that the state of affairs was both injurious to the employers and the employed; and alluding to his own case, where a dispute occurred owing to his refusing to discharge two men employed in a particular class of work, he held that the principle of individual liberty was there assailed. The circumstances were unjustifiable, for who would like to have premises picketed for days together for daring to do what he did? All this occurred through his declining to discharge two men specially skilled for the class of work they were employed upon, and he thought the law ought not to allow premises to be infested as his were, being nothing less than intimidation. With reference to the alleged deterioration of work, workmen were unfairly blamed, and he did not think that there was any deterioration in the character of work.

Mr. Mundella, M.P., felt that the clergy might do great service in promoting arrangements between employers and employed. He had recognised long ago the state of things, as regards strikes, referred to by the previous speaker. Speaking of Mr. Doulton's experience of the "Black Country," he asked what was the condition of nail-makers there. Read, he said, the report of Mr. Baker, the Government inspector, and say if they ought not to be ashamed that in a Christian country such a state of things could exist, such suffering, such poverty, such degradation, little girls from eight to ten years of age beginning to work. The building trade was behind others in the state of feeling existing between employers and employed, for, in the first place, it did not feel the effects of foreign competition. Dealing next with the subject of piece-work, Mr. Mundella agreed that it was the best for both parties. But was it true that trade-unions were opposed to piece-work? There were some solitary cases, but 90 per cent. of the industrial exports of the country were paid for by the piece. As to the deterioration of work, he believed British manufactures never were turned out so good as at present; while, at the same time, there never was so much rubbish turned out. But the latter was not the fault of the workmen, for the British manufacturer was only too ready to turn out what there was a demand for. In conclusion, Mr. Mundella said the remedy in trade disputes was for employers to meet their workmen face to face, and to try to understand each other. He referred to how the Sheffield manufacturers and their workmen thus first discussed their grievances, getting to a good understanding,—a principle which had extended with good results.

Mr. Cremer said that trade-unions were at variance on the subject of piece-work, the objec-

tion not being to the system, but the right of employers to fix the price. He denied that the trade-unions had not raised wages, for when did employers when doing well involuntarily increase workmen's wages? But employers, when trade was bad, with a falling market, did not hesitate to lower the wages.

Mr. Rodwell, Q.C., M.P., protested against the particular form in which some of the unions were conducted,—all in favour of the employed, and against the interest of the employer. There were unions and unions, some deserving of support and others not. He thought the greatest misfortune that had befallen the country at the present time was that Mr. Mundella and others of influence should indulge in the feeling of self-satisfaction and optimism, saying, "We can beat all the world. English workmen can take care of themselves." It was misleading, as he believed that, by some means or other, a considerable amount of trade had been driven out of this country. It would be better to drop that feeling of self-satisfaction, and tell the people that they must be careful to do nothing that would put them in a worse position as regards foreign countries, and that if they wished to hold their own they must not introduce any artificial system which would interfere with what had been properly called the inevitable laws of supply and demand. The reason why this optimism should not be indulged in was that the working classes were not doing their duty to themselves. He complained that trade-unions reduced all to one low level, not allowing any workman freedom of action to do so much work as he felt inclined, if the occasion presented itself. Arbitration was a principle no employer of labour should ever admit; in a question between man and man no one should interfere.

After some remarks from Mr. Young, Mr. Howard addressed the meeting, stating that he knew some instances of wages being raised without asking, and his principle was to pick men and pay them well.

Mr. Hazell thought the limitation by trade-unions of the number of apprentices was not right.

Mr. Hughes, Q.C., M.P., said he looked on a trade-union as a fighting body,—as an army not to be always fighting, but watching the interests of their own side, and fighting for those interests when the occasion arose. It was a sad state of things, no doubt; and he looked forward to the time when it would not be,—when employers and men would work thoroughly together. He thought in the meantime there was no other method of making things tolerable but a system of arbitration and conciliation.

Mr. Ludlow, Q.C., and Mr. King afterwards briefly addressed the conference.

FINE ART EXHIBITION AT DERBY.

THE new buildings for the Derby School of Art (which were illustrated and described in the *Builder* for the 9th ult., pp. 585–88) were opened on the 27th ult. with an exhibition of works of art lent by various friends. The exhibition is said to be a very successful one. In the North Gallery is hung a collection of paintings by Rubens, Rembrandt, Teniers, Jan Steen, Gainsborough, Sir Joshua Reynolds, Vandyke, Wright (a local artist), Sir Peter Lely, Frank Hals, &c. The pictures in this, and in the other galleries also, have been hung by Messrs. Agnew, of London and Manchester.

The Duke of Devonshire, who presided at the opening of the exhibition, said:—Art holds so high a place among the subjects to which the powers of the mind can be directed, that any nation which is indifferent to art must so far lay itself open to the taunt of being content to occupy an inferior position in the progress of civilisation. Independently of such considerations as this, and looking at the subject from the more prosaic and matter-of-fact point of view, I believe that the cultivation of art is of essential importance to us, as one of the necessary elements and conditions on which we can hope to maintain the eminence we desire to hold among the great manufacturing nations of the world. Art embraces a very wide range of subjects. It embraces elementary drawing as well as mechanical and architectural drawing, and designing, modelling, and painting. I believe it is unquestionable that in one form or another instruction in art is of the highest importance towards the successful prosecution of almost every branch of national industry. In some, no doubt, the necessity is more obvious than in others, but to a greater or less degree instruction in art comes into operation in, I may say, almost every branch of national industry and manufacture. I have, therefore, viewed with very great satisfaction the measures that have been taken of recent years by the Government. The promotion of instruction in art, as you are aware, forms a prominent part of the measures of an educational character instituted by the Government, and it is satisfactory to know that those measures have been attended with such great success. I see, from the last report presented to Parliament by the Science and Art Department, that the number of students in this country who are receiving instruction in one form or another exceeds 450,000. Of course a large proportion of those are only being taught the primary elements of drawing; but not only is this large number receiving art instruction in one form or another, but the number is continually increasing, and it is expressly stated that the merits of the students are most decidedly advancing. Passing from the general subject, it will be my duty to say a few words with reference to the subject with which we are more especially concerned this morning,—the Derby School of Art and the Exhibition which I am commissioned to open. I am glad to say, from the reports presented at the last annual meeting of the School of Art, both by the committee and the head-master, as well as judging from what may be collected from the Government report, to which I just now alluded, that the Derby School of Art holds a very satisfactory position among other institutions of a similar character, and is really doing very good work. This is the more satisfactory, inasmuch as the work has hitherto been carried on under disadvantages, but now these disadvantages have been removed by the construction of this building, and I think we may look forward with confidence to a very large and important measure of success. I am very glad to find that although only six or seven years have elapsed since you had a Fine Art Exhibition in Derby, you have again succeeded in obtaining a satisfactory and important collection both of pictures and other works of art. The promoters of the last exhibition, and, I believe, of the present, have very naturally considered it desirable to a certain extent, at least, to give the collection a Derbyshire character, and to make it illustrative of those branches of art in which the county has been distinguished. I have not had an opportunity of learning how far that object has been attained on the present occasion, but if I remember rightly the exhibition on the last occasion was a marked success as a Derbyshire exhibition. At that time, unfortunately, it was notorious that in one respect, namely, the manufacture of porcelain, the neighbourhood had lost the celebrity which at one time it held. I was reminded the other day of what fell from me on the last occasion, when I referred to the fact, at the same time expressing a hope that the exhibition then about to be opened might have some effect in leading to a revival of that manufacture. Now I have been told within the last day or two that there is at present a good prospect, or, I may say, more than a prospect, of the re-establishment of the porcelain manufacture amongst us. I understand it is a fact that works on a considerable scale either have been already established in the town, or are likely to be so immediately, and I am sure it will not be too much to say that we all hope the enterprise will be rewarded with complete success.

A DOMESTIC ECONOMY CONGRESS.

UNDER the auspices of the Society of Arts, and in connexion with the educational institutions of Warwickshire, Worcestershire, and Staffordshire, a congress will be held in Birmingham on the 18th and 19th inst. with a view to the introduction of domestic economy and cookery as a branch of general education, especially in the public elementary schools throughout the country. The subjects to be discussed at the coming congress are food and cookery, household management, cleanliness, health, thrift, needlework, health and sickness, warming, ventilation, &c. Papers have been prepared by Miss Kenrick, on "Results of Needlework in some Elementary Schools"; by Miss Mary Wills, Society of Arts Examiner in Domestic Economy, on "Needlework"; by Mr. Joseph Pope on, "Clothing and its Materials"; by Mr. Edwin Chadwick, C.B., on "Head to Foot Washing"; by Mrs. Watson, on "The Methods of Training Young Servants in Habits of Cleanliness"; by the Rev. Newton Price, of Watford, on "Cooking in Elementary Schools"; by Mr. R. Brown Clayton, on "Experiences of Cookery as taught in Schools"; by Mr. S. Mitchell, M.A., on "The Uses of the Food Collection at South Kensington"; by Mrs. Charles Clarke, on "The National Training School of Cookery"; by Miss Guthrie Wright, on "The Art of Preparing Food"; by Dr. Wilson, on "Errors of Diet"; by Mr. G. C. T. Bartley, on "School Savings Banks"; and by Dr. Langford, on "A Birmingham Board School Bank."

In Section B, Professor Huxley has a paper on "Elementary Instruction to Children in Physiology"; Mrs. W. E. Gladstone one on "Nursing"; Miss Helen Taylor, of the London School Board, one on "Nursing in connexion with Education"; and Mr. Lawson Tait a paper on "Sickness, and how to provide for it." Mr. Rawlinson, C.B., will have a paper on "Buildings for Working Men"; Dr. Alfred Hill, on "House Drains in relation to Health"; Mr. Frank Curson, on "The Appointments and Appearance of the Workman's Home"; and Captain Galton, C.B., F.R.S., on "Warming and Ventilation."

In section C papers will be read by Sir Henry Cole, K.C.B., on "The Practical Development of Elementary Education through Domestic Economy"; by Mrs. Fenwick, of Leeds, "On the Teaching of Domestic Economy in conjunction with Cookery in Elementary and Secondary Schools"; by the Rev. J. P. Fawnthorpe, on "Text-books"; by the Rev. E. F. M. MacCarthy, on "Government Grants"; by Miss Synnot, on "Female Inspectors"; and by Mr. Charles Critchett, B.A., on "The Working of the Examinations of the Society of Arts in Domestic Economy."

SOCIETY FOR IMPROVING THE CONDITION OF THE LABOURING CLASSES.

THE annual meeting of this society was held, June 29th, at Willis's Rooms, St. James's, under the presidency of the Earl of Shaftesbury.

The report, which was read by the secretary, Mr. Charles Payne, stated that the Streatham-street, Bloomsbury, property, comprising fifty-four dwellings for families, had been fully tenanted; Portpool-lane, accommodating 20 families and 128 single women, had maintained satisfactory occupation,—the public washhouse in connexion was reported as largely resorted to and useful; Wild-court, Drury-lane, with accommodation for 102 families, had been well tenanted; Tyndall's-buildings, Gray's-inn-road, renovated for 87 families and lodging-house for 36 single men, had had a full average tenancy; Clarke's-buildings, St. Giles-in-the-Fields, renovated for 78 families, had also been fully tenanted; George-street, Bloomsbury, Model Lodging-house, for 104 single men, gave an average of 102; Charles-street, Drury-lane, lodging-house for 72 single men, had averaged 69 tenants; Great St. Andrew's-street, St. Giles's, renovated houses, for families, reported generally good occupation. The society's annual summary of the deaths and their causes placed the rate of mortality throughout the houses at less than 21. The receipts from all sources during the year were 5,923*l.* 1s. 4d., which, with a balance in hand at the beginning of the year of 544*l.* 3s. 2d., made a total of 6,467*l.* 4s. 6d. The total expenditure amounted to 5,940*l.* 18s. 10d., leaving a cash balance of 526*l.* 5s. 8d. The property belonging to the society was estimated as worth 34,210*l.* 4s. 11d. And the general liabilities amounted to 22,751*l.* 19s., leaving assets to the amount of 12,158*l.* 5s. 11d.

Mr. Cowper-Temple, the Marquis of Hertford, Mr. Smithies, Prebendary Auriol, and the Earl of Shaftesbury, took part in the proceedings which followed.

OPTICAL PROGRESSION.

SIR,—Can any of your correspondents inform me whether there is any scale ascertainable for optical progression to express the diminution of equal bays of a building in perspective? The annexed formula fulfils the necessary condition of approaching equality without ever arriving at it:—

Multiply a by x to n terms,
by $1-x$ to n terms.

Then add, so we have,—$ax+a(1-n) : ax^2+a(1-n)^2$, $ax^3+a(1-n)^3$, &c.

When x and $1-x = \cdot6$ and $\cdot4$, we have 250 : 125 : 80 : 56, &c.; $\cdot2$ and $\cdot8$ give 250 : 125 : 85 : 65, &c.; $\cdot6$ and $\cdot3$ give 162 : 81 : 45 : 27 17 : 11, &c.

W. SCARGILL.

PUBLIC BATHS AND WASH-HOUSES.

MR. E. T. BELLHOUSE read a paper on this subject on the 27th ult., before the Manchester Statistical Society. In the course of his remarks he said:—A studious perusal and careful examination of the twenty-one reports of the Manchester and Salford Baths and Laundries Company, and a personal visit to the establishments at Mayfield, Stretford-road, and Greengate, enable me to furnish some account of the pecuniary outlay which has been incurred, and of the results realised by such outlay; also to deduct useful hints for future guidance from the experience of the past twenty-one years. Firstly, then, as to the outlay incurred. This may be taken as equal to the actual largest amount of subscribed capital, namely, 41,150*l*. Secondly, the results realised by the advance on the part of the shareholders of this 41,150*l*. may be summed up in the following manner:—3,733,293 baths, hot and cold, private and swimming, have been provided, and 617,226 washers have been accommodated, and a profit of 13,627*l*. has been made, which has been paid to the shareholders in dividends averaging about 1·6 per cent. per annum. If we take these profits or dividends, 13,627*l*., from the actual capital paid up, 41,150*l*., it leaves 27,523*l*. as the net amount of expenditure incurred by the company.

With these figures before us, it is curious and interesting as a general deduction to apportion the number of bathers and washers at such prices as will, in the sum total, be about equal to the net expenditure, and the following seems to me to supply a just summary of the twenty-one years' work accomplished by the Manchester and Salford Baths and Laundries Company:—3,733,293 baths, at 1·7d. per bath, equal 26,444*l*.; and 617,266 washers, at ½d., equal 1,286*l*.; making a total of 27,720*l*. At a cost to themselves of 1·7d. per bath, and ½d. per washer, they have provided for the people first-rate bathing and washing accommodation, leaving as their property the land and establishments at Mayfield, Stretford-road, and Greengate: so I think it is right to conclude that their efforts and proceedings had been eminently successful in result. The baths and washhouses provided at Miles Platting by Sir Benjamin Heywood were taken by the company in 1864, but the occupancy was discontinued in 1869, as actual expenditure was not covered by receipts, and commensurate advantage did not seem to accrue to the neighbourhood. Having been associated as joint secretary with Mr. James Dunn in the establishment and planning of the small experimental baths and washhouses in Miller-street, I feel naturally interested in noting the history of that establishment. It was carried on for fourteen years under the original committee, and for fifteen years under the control of the company, its career of usefulness extending from September, 1846, until September, 1875. There has every year been a small profit in working, but the company received notice to quit from the owners of the property, who at the time expected to require land for building purposes. As an experimental forerunner to future progress, this small establishment, limited in extent, only affording the accommodation of sixteen private baths and twenty-six washing compartments, has been highly successful. I find from the books that half a million of private baths have been taken at Miller-street during twenty-seven and three-fourths years, and there were 132,250 washers. A boys' penny swimming-bath was opened at Mayfield in the summer of 1860, as the directors of the company believed that the provision of a cheap bath would prove a great boon to the juvenile portion of the population. This was given up in 1866 for various reasons; the boys did not avail themselves of the advantage as it was expected, and, besides, penny bathers became penny beggars, and it is to be feared that many street Arabs imposed on benevolent passers-by on the plea of wanting a bath. The conversion into a gentlemen's subscription swimming-bath has been attended with tolerably satisfactory results. The annexed figures show the profits of working, after paying all expenses, except interest, during the last three years; also the number of bathers and washers who have been accommodated:—1874: Profits, 652*l*.; bathers, 176,091; washers, 22,477. 1875: Profits, 1,318*l*. 11s. 1d.; bathers, 227,893; washers, 17,458. 1876: Profits, 882*l*. 17s. 6d.; bathers, 208,807; washers, 14,136. Here the vicissitudes of different seasons and circumstances are strikingly illustrated, and the addition of 1866 makes the illustration more striking:—Profits, 843*l*. 3s. 4d.; bathers, 213,114; washers, 48,295. In regard to bathing, it appears that the number of bathers in 1876 is nearly equal to the number in 1866, although two establishments at Miles Platting and Miller-street had been closed before 1876. It may be taken as evidence of increasing bathing habits among the people that in 1876, with three establishments, nearly as many baths were taken as with the five establishments in 1867.

Turning now to the important subject of public laundries, it may be noted that the advantage of combining bathing the person and washing of clothes in one establishment arises from the economy of having the same apparatus for heating water for baths and for laundries. Manchester had far better public washing accommodation in 1866 than in 1876. Ten years ago there were five public laundries connected with the company in Manchester and Salford, with an aggregate of 174 compartments, and the number was 48,295 in the year. In 1876 there were only three laundries, with an aggregate of 100 compartments, and the number was only 14,136 in the year. The corporation of Manchester has adopted the opinion that a reasonable expenditure in providing baths and washhouses in the various districts of the city would be a wise policy, and would meet with the general approval of the ratepayers. As a commencement, the two establishments at Mayfield and Stretford-road have been purchased for the citizens, the land, buildings, and other property having been obtained for the sum of 19,000*l*., subject to existing chiefs. It is probable that the corporation will take possession about next October, and that a brief period will be devoted to making such alterations and improvements as may be deemed advisable. The corporation will proceed, step by step, in providing baths and washhouses in the populous districts of the city, and already negotiations have been entered into for the purchase of an eligible plot of land, 2,200 yards in extent, in New Islington, Ancoats; and another site is being looked out for in the neighbourhood of Rochdale-road. It is to be hoped that ere long a comprehensive scheme for providing the city efficiently with these valuable institutions will be realised. Opinions differ as to whether public baths and washhouses can be worked by the Manchester corporation so as to secure a profit, or whether a deficit will be a necessary condition. To the Corporation of Liverpool is due the credit of originating and developing for the poorer inhabitants a system of baths and washhouses, and it is worthy of remembrance that the first institution in Frederick-street was opened by the Council in May, 1842, three years before operations were commenced in the first London establishment. The precedence taken by Liverpool at so early a period is well maintained by the continuous progress which is being made. There are now seven Corporation establishments in efficient operation, and in a short time the number will be increased to nine. Spacious swimming-baths and convenient private hot and cold baths of three classes are provided in abundance, and the important department of washing and drying convenience is supplied with a liberality which is worthy of imitation. There are at this time 202 washing compartments available, and when the two establishments now being erected are completed, there will be a total of 359 compartments. Although general experience seems to show that public laundries cannot be made remunerative in a pecuniary sense, the advantages arising from their habitual use so greatly affect the sanitary condition and social comfort of the people that expenditure in this direction is a judicious outlay, and it is to be hoped that the Manchester Corporation will follow the liberal and enlightened example of Liverpool.

In the course of the discussion which followed, the chairman (Mr. T. R. Wilkinson) said that Mr. Bellhouse had shown that baths and washhouses did not pay, but, at the same time, he had shown with equal force that it was most desirable that they should not only exist, but increase in number, and that they should be taken in hand by the Corporation. Manchester was about to take the matter in hand, and if it cost 10,000*l*. a year, which he dared say it would, it would be money well laid out.

Mr. Fowler (the borough engineer of Salford) said personally he went a little further than Mr. Bellhouse did in his paper. He thought every working man should have a hot and cold bath in his own house, and he had already got out designs with that view. He did not think that the children and women of the working classes were in the habit of attending the public baths, and if they could get the town's water at a reasonable price, and not be under such heavy restrictions, and agitated so much as to waste water as they were at present, a great stride would be made in the improvement of the health of the people.

Mr. J. G. Lynde (surveyor to the Manchester Corporation) said the question of baths was in the hands of an active committee of the City Council, and he had every confidence that the baths and washhouses would be self-supporting, and not be a cost to the ratepayers.

ST. COLUMBA'S CHURCH, LARGS.

ON the 2nd of August last the foundation-stone of this new church was laid with befitting ceremony, and last week it was consecrated by the Bishop of Glasgow. The church is built in the English Gothic style, and is seated to accommodate 250 worshippers. The building runs east and west, and is entered by a door at the south-west corner. On the west end there are two two-light windows filled with stained glass, each having full-sized figures representing respectively St. Ninian, St. Columba (to whom the church is dedicated), St. Kentegern, and St. Margaret (of Scotland). At the other end of the church, behind the table, there is also a three-light window, which is likewise filled in with stained glass. The windows are the production of Messrs. Heaton, Butler, & Bayne. The next object that attracts the visitor's attention is the reredos, which extends the whole width of the altar, and rises to a height of 6 ft. 4 in. It is composed generally of alabaster. In the centre is a cross of white statuary marble, bosses of Rosso-antico, and pale Connemara green marble; on either side are the letters Alpha and Omega in *lapis lazuli* with white border. The background of the cross of Sicilian marble is carved with passion-flower foliage in low relief and gold ground. The retable is of deep red Devonshire marble, having columns of the same material. To the outside of the cross the Agnus and Evangelistic emblems are carved in light alabaster, in quatrefoil plants, with gold ground. This erection is the gift of the Earl of Glasgow, and is the workmanship of Messrs. Henry Poole & Sons, London. Mr. Alexander Ross, of Inverness, is the architect.

PUBLIC WORKS IN SALFORD.

ON the 27th ult. the members of the Manchester Scientific and Mechanics' Society visited some of the works of the Salford Corporation now in progress of execution. The members first proceeded to Sussex-street for the purpose of inspecting the intercepting sewer in course of construction there. They were accompanied by Mr. Fowler, the Salford borough engineer, who described the works. The work in course of construction in Sussex-street forms part of the intercepting sewer which extends from the west end of Sussex-street to the north end of Montague-street, including the iron culvert underneath the river at the latter point. The intercepting sewer is already constructed through the town for a distance of 3¾ miles, and for the greater part of its length is from 30 ft. to 40 ft. in depth below the surface, and the size of the sewer is, at the outlet, 8 ft. 6 in. diameter, and at this part it is 5 ft. diameter. There are forty-nine sewers now discharging into the River Irwell. The main sewer up to this point will admit of thirty-nine of these being intercepted, and the contents discharged at Mode Wheel, where extensive works are now in course of being designed for dealing with the sewage. The cost of the main trunk sewer, when completed, will be about 72,000*l*., and will admit of draining every portion of the borough to one outlet about a mile below the town. The special features in the scheme are the facilities obtained for passing off the flood waters from the low lands of the borough, as in Lower Broughton, Ordsall, and Greengate, and the provision made for passing off storm-water (by means of self-acting weirs), direct into the river instead of through the main sewer. Special means have been adopted in crossing under the river by flattening the upper surface of the pipes, and, by shortening the line as much as possible so as to obtain the necessary fall, difficulties have been overcome in carrying out the work, as a great deal of private property and buildings have been passed under, including two crossings under the river, the canal, and a large area covered by railways. The portion in Sussex-street varies in depth from

20 ft. to 22 ft. below the surface. A great portion of the ground is artificially formed, the bottom portion being composed of quicksand and gravel. A cast-iron culvert, in course of construction under the bed of the river, is being laid by means of cofferdams, one-half being laid at one time. At this point an outlet will be obtained for the drainage of the whole of the land situate between the canal and the river at a depth of 15 ft. below the surface of the ground, and will be continued along the valley to suit the new roads now in course of construction by the Corporation.

The party next proceeded to Camp-street, and inspected the Irwell-road Bridge. This bridge is intended to form a better means of communication between the townships of Pendleton and Broughton. The new and widened road will extend from Broad-street to Lower Broughton-road, and will be about 1,250 yards in length, and 54 ft. wide. The bridge is on the lattice-girder principle, 140 ft. span, and the same width as the new road; and the soffit of the bridge will be 6 in. above the great flood of 1866, and 14 ft. 6 in. above the ordinary water level. The foundations are constructed on a bed of concrete, placed on gravel, secured by piling 30 ft. deep. The construction of the abutments has been contracted for by Mr. Pilling, of Bolton, for the sum of 14,756*l*. The masonry is of red sandstone, from the Runcorn quarries; the bedstones for the girders, string-courses, and caps for pilasters, are of grey granite. The acceptance of the tender for ironwork is under consideration, and the cost will be about 10,000*l*. There will be about 312 tons of iron in the two main girders, and 330 tons in other parts of the bridge, making a total of about 642 tons of metal, including the ornamental work. The bridge is calculated to carry a live load of 1½ cwt. to the square foot.

The members were then taken to the mouth of Salford main sewer in Mode Wheel-lane. Here an opening was pointed out by Mr. Fowler, who explained that it is intended to fix in it the necessary pumps to raise the sewage in the tanks for deodorisation before it is passed into the river. In the brook is one of the leaping weirs before mentioned for passing off flood waters. There are thirty-six acres of land purchased for this purpose, and the road in course of construction is intended to form the approach to the proposed works.

Throstle-nest Bridge and Road were next visited. This bridge and road are intended to form a means of communication between Old Trafford and the south-west portion of Salford. The road is 60 ft. in width and one mile in length. The abutments are to be of red sandstone, from the Runcorn Quarries. The string-courses and bed-stones are from the Horsforth Wood Quarries, Yorkshire. The foundations are on solid rock, about 14 ft. below the surface of the ground, and the soffit of the bridge is 19 ft. above the surface. The contract has been let to Mr. A. Pilling, of Bolton, for the sum of 13,147*l*. The span of the bridge is 140 ft., and the width the same as the road, viz., 60 ft. The bridge is formed of two bowstring girders, of 152 ft. in length over all, and 17 ft. 9½ in. deep in the centre, with transverse girders placed 5 ft. apart, centre to centre, 4 ft. deep. The total weight of metal, including that for ornamentation, is about 700 tons. It is calculated to carry 1½ cwt. to the square foot. The test for the rolled iron is that it be capable of being bent to a right angle, when cold, without fracture, and to bear a strain of 10 tons per square inch without permanent set, and 21 tons per square inch before fracture.

STEAM-ROLLERS *v.* COAL VAULTS.

AT a meeting of the Chelsea Vestry on the 26th ult., the following report was read by Mr. G. H. Stayton, the surveyor:—

"I regret to have to report that an accident occurred yesterday afternoon in Smith-street, in consequence of the arches of the coal-vaults in front of Waldegrave House and No. 25 falling in at the time the steam-roller (weighing fifteen tons) was working upon the roadway above, but although the conditions were alarming, and the roller was placed in imminent danger of being capsized and bursting the boiler, happily no further harm was done. I took immediate steps for temporarily shoring up the roller and effecting its removal, which was safely executed soon after midnight. Upon a careful examination this (Tuesday) morning, I find that the vaults extend under the roadway *to a distance of nearly 6 ft. from the kerb*, and from the channel outwards the mortar of the arch is very defective, being nearly as soft as putty. I have, therefore, to request your immediate instructions with regard to the restoration of the damaged vaults, and whether they are again to be built out under the highway, or not carried further than the kerb; and I would also suggest that the question of the existence of similar vaults under the roadway in other parts of the parish (which I believe may be regarded as 'dangerous') be referred to the committee of works for consideration and report, and that such reference should comprise the desirability of a standing order being passed limiting the extent of all vaults hereafter to be constructed."

After some discussion it was resolved:—

"That the surveyor be instructed to act in accordance with the 102nd section of the 18th and 19th Vict., viz., that he put the vaults in repair, setting the same back, and that the subject generally be referred to the committee of works."

THE MARLBOROUGH MONUMENT, BLENHEIM PARK.

SOME years ago it was contemplated to restore the fluted column erected to "Marlborough's glory" in Blenheim Park, Woodstock, but, according to the *Oxford Journal*, the enormous expense of erecting scaffolding caused the project to be abandoned. A few days ago, however, a "steeple jack" hailing from Nottingham came and inspected the monument, and soon decided that a thorough restoration could easily be effected without scaffolding. The monument is 130 ft. high. The first operation consisted in flying a kite over the top of the monument, and when well in position suddenly running out a quantity of the string, thus causing the kite to drop on one side of the monument, and forming, as it were, a communication right over the monument from one side to the other. A slightly thicker string was now attached, and drawn over; then a still thicker one, till at last a strong rope, about an inch in diameter, with a pulley fastened in its centre, is pulled over till the pulley reaches the parapet; around this pulley is a smaller rope, called the "endless" one; to this rope a seat is affixed at one part, and at another two weights of about equal balance to the man who is to ascend. A man named Elliott then took his post on the seat, and with but little effort gradually pulled himself upwards. After reaching the figure of John, first Duke of Marlborough, he made his survey, and found that the statue was about 11 ft. high, and made of lead, filled in with concrete, as were the eagles at his feet, and the scroll in his hand. The figure of "Victory," which he formerly held in his right hand, but which some time back mysteriously disappeared, was lying on the parapet. This figure of "Victory" is in the shape of an angel, and is also made of lead, and weighs about three-quarters of a cwt. It was generally supposed that, at one time, a helmet covered the head of the statue, but such appears not to have been the case, as the curls around the head are perfect. On the left shoulder of the statue there is the following inscription, cut with a pen-knife:—"June 8, 1781, G. Austin." This was evidently done by a workman, after the erection of the monument. It is the opinion of those engaged in this restoration that at some time or other the statue has been struck by lightning, as the figure is somewhat "fused," and the pedestal on which it stands is much broken. It is now intended to protect the monument by a lightning conductor, and the whole structure is to be thoroughly repaired. The work is under the superintendence of Mr. Joseph Blackburn, who has been engaged in various parts of England upon similar restorations.

National Industrial Home for Crippled Boys.—The present Home and Refuge for Crippled Boys, situated in Wright's-lane, High-street, Kensington, wherein some fifty maimed lads are now engaged in industrial employment, proving inadequate to meet the increasing demands for admission, the movement of the committee for an extension of accommodation has resulted in the foundation-stone of a new building in proximity to the existing one being laid by the Princess Louise. The new building will contain school-rooms, lavatories, and dormitories, the old building being retained as a residence for the master, &c. The estimated cost for the accommodation of 100 boys is about 8,000*l*., towards which something over 4,000*l*. has been given or promised. Mr. E. C. Robins is the architect.

PROPOSED SOUTH KENSINGTON PNEUMATIC RAILWAY.

THOSE who visit the South Kensington Museum, the Albert Hall, or the Horticultural Gardens, know that certain difficulties stand in the way. The Metropolitan District Railway is very largely used for the purpose, but it is a quarter of a mile from the gardens, nearly as much from the museum, and half a mile from the Albert Hall.

A company is now being formed to construct a pneumatic railway between the South Kensington Station of the District Railway and the Albert Hall. The line will rise the whole way to the Albert Hall, the ruling gradient being 1 in 48. The train will be blown through the tube by an ejector; in other words, a great centrifugal pump, 24 ft. in diameter, fixed close to the District station, and worked by a pair of condensing engines exerting about 170 indicated horse-power. The tunnel will be of brick, and the floor will be paved, and under certain circumstances it will be opened to the public as a dry, well-lighted foot-way, between the Albert Hall and the railway station. Its cross-sectional area will be 105·5 square feet; at the end of the train is fixed a screen or piston with an area of 104 square feet, the difference being allowed for windage. The train will consist of six carriages, of very light build, the rail gauge being 4 ft. The train will hold 200 passengers, and the total load will be 32 tons, or ten tons less than the weight of a single engine on the Metropolitan Railway. The maximum resistance at twenty miles an hour will be about 2,420 lb., requiring to overcome it a pneumatic pressure of 2 6 ounces per square inch, and 162-horse power, assuming the useful effect to be 60 per cent.

It is beyond our province to deal with the commercial success or failure of a railway company, but we may say that the scheme has so far advanced that Mr. Rammell has got together a good board of directors for his company. The capital required is 60,000*l*., and the Metropolitan and District railway companies are supporting the scheme in a very practical way by guaranteeing a 4½ per cent. dividend.

THE KNOX MEMORIAL INSTITUTE, HADDINGTON.

THESE buildings, which are intended to serve as a memorial of John Knox, are about to be erected from plans prepared by Mr. Starforth, architect, Edinburgh, and will cost 7,000*l*. They will comprise an elementary school, in addition to the proposed Knox Institute. The site covers an area of nearly two acres. The ground-plan of the schools forms a parallelogram, the Institute being on the north and fronting the road, and the elementary school buildings to the south. The memorial school provides accommodation for 200 boys and 100 girls. While the necessary class-rooms, teachers' rooms, lavatories, cloak-rooms, &c., occupy the ground-floor, there is provided in the upper story a lecture-hall, having a floor area of about 2,000 superficial feet, and capable of seating about 400 children. Covered play-courts extend east and west from the main building, forming partitions between the playgrounds. The elementary schools provide accommodation for 150 boys, 150 girls, and 100 infants. The principal frontage (being that to the main road) extends to about 90 ft., having the entrances to the schools recessed back on the east and west sides. The style adopted is a modification of Early English. In the centre of the frontage a tower 14 ft. square rises to the height of about 80 ft., having a canopied niche in which is placed a full-sized statue of John Knox, and affording in its upper stage accommodation for a clock and bell. The principal gables have three-light windows, with single side-lights, separated by broad piers, at each end of the hall; and beneath the side-lights are niches, while in the centre beneath each of the three-light windows are large panels for sculpture, representing incidents in Knox's life.

THE DECORATION OF ST. PAUL'S.

SIR,—In Harrison's "History of London" is the following statement. He has not given his authority for it:—

"As Sir Christopher was sensible that paintings, though ever so excellent, are liable to decay, he intended to have beautified the inside of the cupola with mosaic work, which strikes the eye of the beholder, and, without the least fading of colours, is as durable as the building itself; but in this he was unhappily overruled, though he had undertaken to procure four of the most eminent artists in that profession from Italy."

B. S.

FACULTY FOR A TOWER AND BELL.

AT the Consistory Court on the 2nd inst., before Dr. Tristram, the Rev. R. W. Forrest, the vicar, the Hon. C. J. Keith-Falconer, and Mr. H. Clifford, the churchwardens of St. Jude's, West Brompton, applied for a faculty to erect a tower and spire to the church, from the designs of Mr. Henry Godwin, architect. The expense would be about 4,000*l.*, and 2,400*l.* had been contributed.

Dr. Topham, M.D., who lived opposite the church, attended, and asked that the order should be for one bell, and not for a peal, as it would cause a great annoyance, and depreciate the property.

The Hon. Major Falconer said he should certainly object to a peal of bells; and in a discussion before the Court it was stated that no order could be made to "bind posterity."

Mr. Moore applied for the faculty.

The Court allowed a faculty for the works, and for one bell only, as there was no power to bind posterity as to additional bells, but the record would show the objection made to a peal.

The Chancellor gave permission for the works to be commenced at once.

THE STUDENTS OF THE ARTISANS' INSTITUTE AT DULWICH COLLEGE.

A PARTY of students connected with the Artisans' Institute, accompanied by the Rev. Henry Solly, the principal, on the invitation of Dr. Carver, head-master, paid a visit to the "New College of God's Gift," Dulwich, on Saturday. Dr. Carver conducted the party over the principal parts of the college, pointing out the various objects of historical and educational interest, ancient and modern, including the old oaken treasure-chest, with its three different locks, bolts, and keys, as held by the master, wardens, and first fellow, under the original foundation of Edward Alleyn, the actor, as founded by him under letters patent, James I., 1619; the safe-door, and its three locks and key, with strong bolts; "The Diary and Book of Mixed Records," as kept by the founder; and the portraits of Alleyn, and James Allen, one of the early masters under the old corporation. The picture gallery was also visited, the party being shown through the collection by Mr. Hoskyns, the custodian. A visit was likewise paid to the Old College, the chapel grounds, the class-rooms of the Lower School, and the almshouses. During the proceedings an address of congratulation was presented to the Rev. Dr. Carver, the head-master, on the results of his nineteen years' mastership.

PROPOSED BRIDGE OVER THE THAMES.

AT the last meeting of the Court of Common Council, the Lord Mayor presiding, Mr. H. K. Isaacs, in proposing the adoption of a report by the Special Bridge or Subway Committee, recommending the erection of a low-level bridge east of London Bridge, said such a bridge, with mechanical openings for the passage of ships would cost only 750,000*l.*, against two millions the cost of a high-level bridge, and 1,500,000*l.*, which would be required for the construction of a subway. The advantages of a low-level bridge were many. The approaches would be shorter, and as a consequence better, while they would thus be enabled to divert most of the heavy traffic of the City. Under these circumstances he hoped the court would agree to the opinion of the committee, and refer the report back to them for them to consider where the cost was to come from, and to consult with the Government and other bodies in reference to it. Mr. Davies moved as an amendment that the report should be sent back to the committee for reconsideration. He thought that the openings for the passage of shipping in the proposed bridge would cause most serious inconvenience to the traffic. Other members objected to the court being bound to adopt the plan for a low-level bridge; but the original motion was carried by a large majority.

Wandsworth Board of Works' Surveyor. At the last meeting of the Wandsworth District Board of Works, the salary of the surveyor, Mr. J. C. Radford, C.E., was increased to the extent of 50*l.* per annum, with complimentary expressions.

KENSINGTON PALACE.

SIR,—Sinking fast into decay, this ancient structure is now in such a wrecked condition that it must soon be repaired thoroughly, or rebuilt. It is many years since it was used as the abode of royalty, George II. being the last monarch who, with Queen Caroline, made it a home and a solace until the year 1760.

When purchased by William III. of Sir Heneage Finch, most of the old buildings were abated, but a portion of the then suburban villa was incorporated with the structure, modernised, and adapted for a royal palace; and the grounds, to the extent of about 250 acres, were afterwards planted and laid out by Repton, with vistas through ranges of forest-trees, now grown to maturity. The site of the palace itself, together with gardens, outer grounds, and meadows, occupies, however, 50 acres more in an elongated parallelogram, extending along the west boundary from Kensington-road to Bayswater: the whole of this space is uninclosed, and might be added integrally to the gardens and park, if the old fabric were cleared away, and a suitable palace for the urban abode of royalty erected on an appropriate position, for which ample provision has been made in the design of the great landscape gardener who first laid it out.

The juxtaposition of Hyde Park, which in its present aspect of hortulan improvements transcends all other open urban spaces, doubles the area of the gardens, and makes the eastern end of Kensington Gardens the most eligible position for a royal palace, being the highest, the most open and healthy, spot of the whole *enceinte*. Here the great public thoroughfares from Queen's Gate across the Serpentine Bridge and the circuit of park-drives all converge; besides that, from the spot indicated the great open central glade discloses a view of the old Palace, across the waters of the Upper Serpentine and the Round Pond.

On a site in line continuous north from Serpentine Bridge, and about 300 yards distant from it, being say 100 yards from the boundary-wall and fosse, standing on the highest elevation, above the Serpentine, and commanding uninterrupted views of both park and gardens, a royal palace might be erected, adequate to the requirements of the British Sovereign, and equally eligible for the reception of levees and drawing-rooms, the position being even more convenient for the aristocracy, and much preferable in most respects to the sleepy hollow of Buckingham Palace.

This section of the gardens commands the two portions of the Serpentine and its fountains, with views from Kensington and Notting-hill to Park-lane; and the palace would be easy of access from Belgravia, with its western extension, as from the Grosvenor, Portman, and Tyburnian districts; while the unequalled aspect of a splendid park of altogether 600 acres, in the centre whereof the palace might be interned, together with the salubrity of position, makes it appear strange that this site has never been mentioned before.

For the public, the great inducement would be the gain of fifty acres on the western end, and an extension of the walks and shrubberies throughout the circuit; besides the inestimable benefit of a grand open thoroughfare from Kensington to Bayswater, which have now no practicable line open between Park-lane and Church-street, Kensington,—exceeding a mile on both roads! The road here suggested might commence at the old Palace gates and terminate at Bayswater. One great advantage of this site for a palace is that Exhibition-road leads direct across the bridge in a straight line, and this, if continued, would strike into the Westbourne-terrace traverse at a point only a few feet from the fosse and wall in Hyde Park. At present there is, however, a very awkward descent of 15 ft., and long curve round the powder-magazine, which might be corrected and avoided by making the public road continuous in a straight line, leaving the present carriage-drive unaltered. The utility of the traverse route lately opened across the park is proved by the vast numbers of private and hackney carriages which use it; in fact, it is crowded by the incessant roll of vehicles from the hour of opening until that of closing the Park-gates, so that no greater boon of thoroughfare could be conceded to the public, many thousands passing daily through this, the only medium of intercourse between the two great north and south aristocratic suburbs, which are severed by the Park and Gardens.

T. H. H.

TEMPORARY BUILDINGS.

AT the weekly meeting of the Metropolitan Board of Works on the 29th ult., the Building Act Committee submitted the following regulations relative to the inspection of temporary buildings, when an extension of the period for use is applied for, and recommended that the same be approved and adopted by the Board:—

1. On the application from the trustees or owners of any temporary church or school, or any iron building, for an extension of the period allowed for its use by approval of the Board, the district surveyor shall be requested to inspect the structure, and to certify as to its condition and stability for use for such a period of years as may be requested, and as to any necessary repairs for additional strength.
2. If the structure has existed from two to five years, a special service fee of 2*l.* may be demanded and received for the certificate regarding structural stability.
3. If the inspection is merely to ascertain that the structure is not altered as to condition or position, and to certify that an extension of time might be allowed, a special service fee of 10*s.* may be demanded and received.

This report was adopted.

VALUE OF CITY PROPERTY.

THE following important sites have recently been let by Messrs. Harvey & Davids:—

Moorgate-street, at the Corner of London-wall, the original site of Albion Chapel, with extensive frontages covering an area of 5,400 ft., was let at 2,350*l.* per annum.

Cheapside.—A plot of land having important frontage to Cheapside and extending through to Queen-street, covering an area of about 4,200 ft., was let at 2,300*l.* per annum. It may be stated that on all these sites new buildings comprising shops and offices are in course of erection.

If we suppose the ground-rent of the Cheapside plot sold to pay the buyer 4 per cent., we get about 600,000*l.* as the price of the land per acre. If bought to pay 3 per cent., and when the new houses are finished it might not be difficult to get a purchaser at this, the price per acre would become about 800,000*l.*

CASES UNDER METROPOLITAN BUILDING ACT.

CONCRETE WALLS.

THE District Surveyor of Bromley, Middlesex, summoned a builder before the magistrate at the Thames Police-court for partially constructing the party walls of three houses with blocks of concrete without obtaining the special sanction of the Metropolitan Board of Works.

This case was of importance, inasmuch as it was contended by Mr. May, who appeared for the defendant (Mr. Wm. Harris, of East India-road):—(1). That the concrete used by his client was a "hard and incombustible substance" within the meaning of the Building Act; and (2) that the Metropolitan Board of Works had no power to grant licences nor to enforce rules for the composition of concrete.

Evidence was given by the District Surveyor to prove the use of concrete in the construction of the walls as alleged in the summons, and the chief clerk of the Superintending Architect's department of the Board of Works was called, who stated no application to the Board had been made by the defendant for the construction of the walls in concrete.

Both these witnesses concurred in stating that the concrete used by the defendant,—a sample of which was produced in court,—was of a friable nature, and very inferior to such concrete as would be made if the rules contained in the licences granted by the Board had been properly acted upon.

Two surveyors were called for the defence, and, although one of them confessed that the concrete used by the defendant was "rather brittle," they, nevertheless, stated that in their opinion it was a suitable material for walls of small two-story houses, and, as it was "hard and incombustible," it appeared to them to literally fulfil the requirements of the Building Act. Mr. Wicks, a builder, was also called by the defendant, and stated that some years ago he built a lot of houses in Poplar entirely of concrete, and of a description certainly inferior to that used by the defendant, but no objection was raised to the employment of it.

The magistrate (Mr. De Rutzen), having taken time to consider the matter, delivered judgment to the following effect:—

"I do not intend to enter into the question as to whether the concrete used by the defendant is

a 'hard and incombustible' material within the meaning of the statute; but I purpose confining myself to the issue raised by the district surveyor, which is simply,—Is a person who wishes to build the walls of a building with concrete required to obtain the special sanction of the Metropolitan Board of Works for the use of such material? On referring to the 1st Schedule Preliminary of the Building Act, I find it laid down in the 2nd rule that every wall shall be 'properly bonded,' and I hold that this is not applicable to a concrete wall, and I am of opinion that buildings constructed of concrete are buildings to which the rules of the Building Act are inapplicable, and that, therefore, the special sanction of the Metropolitan Board of Works to the erection of such buildings is required to be obtained in accordance with the 3rd rule Miscellaneous, 1st Schedule Preliminary of the Building Act. It appears to me most essential that proper control should be exercised over the composition of concrete intended to be used for walls of buildings; otherwise friable, and therefore unfit, material might be used for that purpose under the name of concrete, and there would be danger of such buildings falling. In the case now before me it appears that only a small portion of the walls has been built in concrete: I therefore do not propose to make an order to pull them down, unless the Metropolitan Board of Works consider such a step necessary."

AN ARCHITECT'S CLAIM.

FISHER *v.* SIMPSON.

IN this case (heard at Northallerton County Court on the 16th ult., before Mr. E. R. Turner, judge), Charles Fisher, architect, of Sand Hutton, near Thirsk, sued Isaac Simpson, of Brompton, farmer, for the amount of 8*l*.

Mr. Fisher stated that he had several interviews with the defendant about erecting a dwelling-house and outbuildings. At one of those interviews they came to terms, that he was to draw plans and make out specifications, and superintend the erection of those buildings, and that he should receive from the defendant as recompense 2½ per cent. upon the contract price. About two months after the building had been going on, he met defendant upon Darlington-road, and told him that unless the buildings were built according to contract he would not be answerable for the work done. At that time he had attended about seven or eight times and inspected the works.

Mr. Isaac Ward, of Brompton, builder, stated that he was present when plaintiff and defendant arranged the terms.

At this point the judge remarked that the plaintiff had not fulfilled his agreement by not attending three times a week to inspect the work. He gave a verdict for the defendant, without costs.

WEST KENT SEWERAGE WORKS.

IN 1874 the Bromley Rural Sanitary Authority instructed Sir Joseph Bazalgette to prepare plans for the drainage of their district, which resulted in the necessary powers being obtained for the construction of the main intercepting sewer of the present undertaking. The Cray Valley Sewer Scheme of 1868, having since been sanctioned by Parliament, forms a branch to the main sewer which it joins at Bexley.

The West Kent Main Sewerage is entirely a gravitation scheme, and is designed for the accommodation of the parishes in the Bromley Union. The works consist of the main line of intercepting sewer, fifteen miles in length, and the branch, which is six miles and a half in length. Some portions of the main sewer will be in tunnel, and there,—as also in deep cuttings,—the sewer will be egg-shaped in section, 6 ft. high by 4 ft. wide internally, and 9 in. thick. It will be built with blocks of Portland cement concrete to a height of 4 ft.—that is to the springing of the arched roof, which will be constructed of brickwork in cement. Where the sewer is carried through open cuttings, or in embankments, it will be circular in section, 5 ft. 6 in. in diameter, and 9 in. thick, and will be built in solid concrete. At one point in its course the sewer will pass under the River Cray, and there a piece of special construction occurs. The sewer is divided into two iron tubes on one side of the stream, each 4 ft. in diameter, set in concrete, and united again on the other side. The sewer will be carried under Dartford Creek by a syphon arrangement consisting of two iron tubes with penstock chambers at each end.

At Dartford Marshes, near the outfall, there will be a reservoir 500 ft. long and 120 ft. wide, which will be used for filtering the sewage prior to its being discharged into the River Thames at ebb tide and below low water. The reservoir will be constructed of concrete, and divided into several compartments, or bays, with the view of enabling the filtering operation to be carried on continuously.

The Cray Valley branch commences at Orpington by a pipe-sewer, which gradually increases in size until the diameter is 2 ft. 6 in. at its junction with the main sewer at Bexley. The levels throughout the main sewer are variable, the flattest fall being 3 ft. in a mile. On the Cray Valley branch the levels are also variable, and, generally speaking, steep, the flattest fall there being 1 in 1,000. The works of the main sewer were commenced about four months since at a point in the route called Halfway-street, near Sidcup, and they are being vigorously prosecuted over a length of two miles.

Considering the adverse nature of the weather since the works were started, very good progress has been made by the contractors, Messrs. John Neave & Son, the work done being of good quality. At the present time eight shafts have been sunk down to the level of the sewer at a depth of from 40 ft. to 50 ft. from the surface, and three other shafts are being sunk and will shortly reach the sewer level. About 800 ft. of sewer in tunnel have been executed, and a further length of about 1,650 ft. has been constructed eastward of Penhill Bridge in open cutting. It is anticipated that the works will be completed out of hand in a little more than two years from the present time. The concrete in the sewer in tunnel is in the form of blocks, which are moulded at surface and set in cement. By adopting the concrete system of construction a considerable saving is effected in the cost of the works.

CHURCH RESTORATION.

SIR,—I read with much interest the remarks made by Sir G. Scott and others upon the above subject in your recent numbers, but it seems to me they have not got at the root of the evil.

I restored a church about five years ago, under a good architect. Immediately I commenced the work the vicar took upon himself to order things to be done without the architect's consent,—mark you, he had the power, according to the contract, to do so. Well, the first thing he ordered to be done was to re-dress the old east window, then the south windows, and last, the arch and label of the old porch, which was the most beautiful feature of the church. I need not tell you how angry the architect was when he saw it.

Sir G. Scott blames the builder, clerk of works, &c., but the difficulty will not be stopped until the architect in all cases reserves to himself the right to order all things to be done in connexion with the work. How can the builder help himself when he has to take his orders from the architect's client instead of from the architect? What architects should do is this,—see all agreements before they are signed, and oppose any infringement of their rights by their client. I know the rule is and has been for the architect to do all this, but I assure you there are a great many exceptions to that rule in Monmouthshire and other districts not far off.

Until the course I have suggested is taken, you may be sure that the Institute will not stop the destruction of the ancient work that true restorers so much cherish. J. M. L.

THE BEDFORD ESTATE.

SIR,—I hope the Duke of Bedford, when he appoints a new steward, will do as the writer of a letter in the *Builder* of May 5 suggested, viz., appoint an architect to the post; and when the new steward is appointed, I hope he will not act in the same manner towards the tenants as the late one did.

But pending such appointment,* I beg to call the attention of his Grace to some evils that exist in Covent-garden Market. The dangerous state of the footpaths at the western end of the market is a matter of every-day comment; while the raised platform, some 6 in. high, in front of D. & D. Pankhurst's shop, is alike dangerous to life and limb, for people are constantly falling over it, more especially on a Sunday, and some very ugly falls indeed have taken place there.

Then there is the nuisance of the Sunday-morning markets, which are held in direct contravention of the Act of Parliament. Bye-law viii. enacts that,—"No fruit, flowers, vegetables, roots, herbs, or other things, shall be placed, pitched, exposed for sale, or sold in any part of the said market on a Sunday." I can scarcely believe that his Grace is aware of this open violation of the Act every Sunday at this season of the year. But there is one more evil I have to complain of, and that *is*, that the market is now watched by the metropolitan police instead of the beadles, as formerly, who were under the direction of the market authorities, whereas the police are not.

Formerly, if we were annoyed or abused in any way, and bad language were used, the beadles would take the man or men into custody: now we are told by the police that we must take out a summons in such cases. So we are under two authorities instead of one. The metropolitan police act in direct antagonism to the Act of Parliament for the control and management of Covent-garden Market. I venture to ask his Grace, who is one of our hereditary legislators, if this is a satisfactory state of things anywhere or in any place, but more particularly in such a place as Covent-garden Market.

A SALESMAN.

* The appointment has been made, and an architect has not been selected.—ED.

CLEOPATRA'S NEEDLE.

SIR,—Not being in a position to question the merits of the different sites suggested for the Egyptian obelisk, I can only hope that the same mistake may not be made in London as in Paris, where, despite its plinth or pedestal, which does not belong to it, and certainly seems out of place, the size and proportions of the Luxor monolith are entirely lost, owing to the immense area of the Place de la Concorde.

In Egypt, these obelisks were generally,—if not always,—placed immediately in front of the pylons, or other solid masonry of the temples, as at Luxor, and no doubt an equally appropriate position might be selected in London for "Cleopatra's Needle." G.

PIECE-WORK A PANACEA.

SIR,—I have lately read your leading article headed "Strikes, Lock-outs, and Arbitration," and venture to make a few remarks thereon.

First and foremost, are the employers of labour the best possible advocates for arbitration? Secondly, who is to blame for this civil warfare betwixt capital and labour? I may justly answer, the armed capitalist. He holds the sinews of this bloody conflict.

I am a workman, and am an advocate of the reforms which you propose. If we want a healthy tone in trade, piece-work is the best remedy. While I write you I have by me an old book of the laws 150 years ago, which state day-work and piece-work prices, and no one at his peril dared to trespass against the law. Why not let history repeat itself, and return to some of its old customs? But the liberty of the subject depends on his good behaviour for the most who are concerned, which all sound undertakings should make their motto. Why should the employers make such haste to be rich, and why should the workman dictate to his superior, so-called? Simply because man is a creature of progress, and no fixed law will meet his desires;

> Therefore let piece-work prevail,
> Since warring and strife are of no avail.

Make one good sound beginning in some large firm, and the time has come that all men and good employers will gladly follow the lead.

George Potter, like myself, years ago, would gladly have come to terms of arbitration universally; but he was overruled by the less intelligent of his trade. He counted the noses and did not forget to protect his own by so doing.

I am quite sure piece-work would act with better results even than arbitration; in fact, it would strengthen the back-bone of every trade in England. Nothing can surpass a free sale. All artificial attempts to monopolise bring ruin wherever they are fostered.

WM. WEATHERILL.

The Proposed Bridge at the end of Northumberland Avenue.—At the last meeting of the Metropolitan Board of Works, it was resolved, on the recommendation of the Works Committee, that Messrs. Burrell & Valpy be informed, in reply to a letter suggesting the construction of a bridge over the Thames, in continuation of Northumberland Avenue, and transmitting designs and plans showing its position and approaches, with an estimate of the cost, that the Board is not at present in a position to take any steps in regard to the matter.

HINDLEY CEMETERY COMPETITION.

SIR,—In the competition for Hindley Cemetery, recently decided, the surveyor to the Board, to whom the competing architects had to apply, and by whom particulars were furnished, was allowed to submit designs. They were selected, and the first prize awarded for them.

Will you express your opinion as to the fairness or otherwise of this course? The Board maintain that they had a perfect right to receive and select his plans. I and other competitors contend that any one connected officially with the Board was debarred in honour, if not in law, from competing.

R. KNILL FREEMAN.

*** We fully agree with our correspondent. The Board necessarily expose themselves to suspicions of unfairness by the improper course pursued.

Miscellanea.

The Metropolitan Drinking Fountains Association held its annual meeting on the 30th ult., the Duke of Westminster in the chair. The report, read by Mr. John Lee, the secretary, stated that 33 drinking-fountains for human beings and 58 troughs for animals had been erected during the last twelve months, making a total number in London at the present time of 324 drinking-fountains and 342 troughs. In accomplishing this they had expended all the funds at their disposal, and had also rendered an annual increase of income necessary for the permanent supply, supervision, and repair of the metropolitan fountains and troughs. Notwithstanding the extraordinary progress made, there were still hundreds of miles of streets in London where neither man nor beast had the remotest chance of obtaining a drop of water to quench thirst. The operations of the society extended over a district covering more than 800 square miles. After referring to the earnest support that the association received from the various vestries and district boards of the metropolis, and to the fact that the Queen was a donor of 100*l.*, the report stated that the donations during the year amounted to 1,769*l.*, the subscriptions to 1,528*l.*, and legacies to 2,000*l.* The Hon. A. Kinnaird, in seconding the adoption of the report, suggested that an attempt should be made to get 1,000 subscriptions of 5*l.* and 500 of 10*l.*, so as to raise a sum of 10,000*l.* within the next five or six months, and at once largely extend the area of the work of the society.

Recreation Gardens, St. Pancras.—On Thursday in last week the disused burial-grounds of Old St. Pancras and of St. Giles's-in-the-Fields, were opened as public recreation gardens. The grounds, which have historic interest, are in the Old St. Pancras-road, and the church in the centre of one is stated to be the last in England in which the ceremonies of the Romish Church were performed before the Reformation. Part of the grounds is the spot formerly known as the burial-ground of St. Giles's-in-the-Fields. A few years ago the St. Pancras authorities successfully opposed the endeavours of certain railway companies to convert these burial-grounds into a railway depôt. Walker, the author of the Pronouncing Dictionary; Flaxman, the sculptor; Sir John Soane, the founder of the Museum bearing his name; Woollett, the engraver; William Godwin, the author of "Political Justice"; and Mary Wollstonecraft Godwin, were buried here; while among the foreigners—most of whom were interred soon after the first French revolution—were De Broglie, the Marquis de Tourville, the Marquis de Breffevent, the Marquis de Bonneval, the Comtesse de Chateaubrun, the Comte de Front, the Comtesse de Montant, the Comte d'Herville, Field-Marshal of Russia. In the naming of the various avenues, historic names have been preserved. At one spot in the Old St. Giles's ground Lady Burdett-Coutts laid a memorial-stone to the dead who lie buried there. A memorial tree was also planted and an obelisk uncovered. The authorities of St. Pancras deserve praise.

Surveyorship.—At a meeting of the Wolverhampton Town Council, Mr. G. Eastlake Thoms, C.E. (Great Crosby Local Board), was appointed, by a large majority, engineer and surveyor for the borough of Wolverhampton, at a salary of 500*l.* per annum, in place of the late Mr. A. Morgan, C.E., brother of the Government inspector. There were fifty-two applicants for the vacant office, and of these, three were selected for the consideration of the Council. It may be mentioned in connexion with the appointment that a large scheme, under the Artisans' Dwellings Act, which will involve an expenditure of 162,000*l.*, is about to be carried out in Wolverhampton.

Church Restoration.—When the Archbishop of Canterbury consecrated the new church of St. Luke, Ramsgate, he said:—The most rigorous adherent of simple worship will, I think, look upon it as a bad sign in a Christian nation when houses are exquisitely furnished and churches present a mean appearance, as if they were little cared for. I am quite prepared to grant that, in the age in which we live, it is a very happy circumstance that so very much has been done for the building and restoration of churches in good taste; that in the last forty years thirty millions of money or thereabouts have been spent by members of the Church of England in the restoration of old churches and on the building of new ones; and I trust we shall not go backwards in this respect, but that, as the population of these islands is marvellously increasing, so we shall keep pace with the population by the erection of new churches. But it is not desirable that our minds should be altogether taken up with thankfulness that so much has been done for the outward decency and beauty of worship; if there be a real love for this in the hearts of Christian men, it will be because we believe that, through the grace of God, our churches are real centres of Christian life.

Domestic Economy.—The report of the Educational Officer of the Society of Arts gives the results of the recently-held examination in domestic economy. The subject was introduced for examination for the first time last year. The examiners appointed for this year were Miss E. Shaw-Lefevre for "Housekeeping and Thrift," Miss Mary Willis for "Clothing and its Materials," Dr. Ogle for "Health," and the National Training School for "Cookery." Though the number of candidates was small, it was larger than last year. The numbers last year and this year were as follow:—Clothing, 10—16; Cookery, 10—26; Health, 8—35; Housekeeping, 9—17. In Cookery all the candidates passed (fifteen first and eleven second class); in Health twenty-six failed, and only three passed in the first class. In Housekeeping eight failed, and six passed in the first class. Among the successful candidates are several young men, five of them taking first-class honours in Cookery. The first prize in Cookery, with the added Council prize of ten guineas (for females), was carried off by Mary S. Mugeam, of the Birkbeck Literary and Scientific Institution.

Exhibition of Trade Marks.—A permanent exhibition of the trade-marks sent in to the official registrar for registration under the Trade Marks Registration Act opened on Monday last at Castle-street, Holborn. Registration is required before the proprietor of a new trade-mark can take any proceedings for its protection, and the applications for registration are published periodically in an official journal. The marks are divided into fifty classes, and a new mark cannot be registered in any one of them unless it is essentially different from the other marks registered in the same class. Hence, to manufacturers and merchants desirous of registering, a classified representation of the trade-marks already applied for will be invaluable, as obviating the delay and difficulty attending a search of the official records. In the Trade-Marks Exhibition, Mr. E. Johnson, who has devoted much attention to the subject of trade-marks, and is a warm advocate of a system of international registration, has provided such a representation.

The Curatorship of the Walker Art Gallery.—A meeting of the Library and Museum Committee of the Corporation of Liverpool was held on the 25th ult. for the purpose of selecting a candidate for recommendation to the Town Council to fill the position of curator of the new Art Gallery. The committee had previously selected eight candidates, all of whom were in attendance. The majority of the committee were, it is understood, after a long discussion, in favour of recommending for the appointment Mr. Wallis, of the South Kensington Museum. The next in favour was Mr. C. Dyall, secretary of the Liverpool Lyceum. The recommendation of the committee will be brought forward at the next Town Council.

Dry Rot.—The best preservative against dry rot, says the *American Journal of Pharmacy*, is the following of Mr. Schwartze, by whose death the secret is revealed: 1 part of oil of cassia, 1 part wood tar, and 1 part train oil; apply three coats on the reverse sides and on the ends of planks, floors, &c.

St. George's Hall.—A merry sketch, entitled "A Happy Bungalow," from the pen of Mr. Arthur Law, has been produced here, and forms a most acceptable feature in Mr. and Mrs. German Reed's Entertainment. From the title of the piece it may well be supposed that the scene is laid in India. The principal parts were very well sustained by Miss Holland, Mrs. German Reed, Mr. Law, and Mr. Corney Grain, while Miss Leonora Braham and Mr. Alfred Reed as the *Ayah* and the *Bhoy* represented those characters in most amusing fashion. Mr. Corney Grain's "Edwin and Angelina," and Mr. Burnand's "No. 204," followed, and afforded additional satisfaction to the audience. Mr. Grain in his last sketch is particularly happy, and makes his audience so too. A very prosperous season will close on Saturday next, the 14th inst., and after a short tour in the southern provinces, Mr. and Mrs. German Reed will open the St. George's Hall again on the 1st of October.

"Morocco Tiles."—Messrs. Mintons, Stoke-on-Trent, have recently produced some new tiles, by a process patented by them. The improvement on the ordinary method consists, in the first place, of a process by which the tiles are covered with a granular semi-vitreous surface that will, while retaining its hard and impervious quality, prevent the reflection of light which is given from smooth glazed surfaces, and which is sometimes objectionable. This surface is capable of being either painted or printed on, the *modus operandi* differing from the usual method, and this constitutes the second part of Messrs. Mintons' patent. The effect produced is very similar to morocco leather, after which the process has been named.

Failure of a Bridge.—At Saltash, on the 27th, it being Coronation-day and Saltash regatta, the steamers plying between Devonport and Saltash were crowded, and when the last steamer arrived alongside the landing-stage some hundreds of persons rushed towards it, crowding upon the narrow wooden bridge connecting the stage with the shore. Suddenly a crack was heard, and the bridge burst in two, precipitating the struggling crowd upon it into the water. Although it was high tide and a strong stream was running in the Tamar, the water was not deep, and all were got out alive.

The Drainage of Lincolnshire.—Sir J. Hawkshaw, C.E., has prepared a report with a view to the improvement of the drainage of Lincolnshire. The works proposed will, if carried out, involve an estimated outlay of 567,820*l.*, irrespective of Parliamentary and engineering expenses. The most important works proposed are the following:—Widening and deepening the Witham from Horsley Deeps to the Graud Sluice, 197,000*l.*; new sluice and bridges at Boston, 80,000*l.*; and low level drain to Chapel-hill, including a pumping-engine of 300 horse-power, 72,000*l.*

Royal Academy.—The following gentlemen have been admitted as students of the Lower School of the Royal Academy:—James M. Brooks, E. L. Drew, S. W. Grant, P. P. Green, A. Gillespie, W. G. B. Lewis, W. Murray, W. H. Peck, H. O. Pinchin, G. H. Shackle, E. S. Shearman, and H. W. Stock. As probationers:—G. H. Coldwell, R. W. Collier, J. A. T. Johnson, and T. L. Moore.

The Mayor of Pontefract (Mr. R. Moxon), at a meeting of the town council on the 28th ult., submitted a thorough scheme of drainage for the borough. The council voted, and decided that the question should be again deferred, whereupon the mayor said that the drainage of the town had long been his study, and not having the confidence of the council he should resign the office of mayor, and pay the fine of 50*l.*

Domestic Decoration.—Sir: Permit me to thank you for the favourable notice of my invention, "Xylography," and to state in reply to the question concerning the designs, "Could they not be executed on thicker wood than is now used?" that they can be as readily produced on thick wood as on thin, all that is requisite being a slight modification of the machinery for the purpose.—THOMAS WHITBURN.

Great Malvern.—A new Roman Catholic Church was consecrated at Blackmore Park, the seat of Mr. J. V. Hornyold, a few days ago. Mr. Purday was the architect engaged. The reredos, a work 15 ft. high, was executed by Mr. Roddis, of Birmingham; the metal-work by Messrs. Hardman & Co.

TENDERS.

For alterations and additions to the Acton Baptist Chapel. Mr. Edward Monson, jun., architect. Quantities supplied:—

Nye	£1,047	0	0
Waters	998	0	0
Baker	950	0	0
Haynes	945	0	0
Keyes & Head (accepted)	920	0	0
Rydmann	910	0	0

For the erection of four villa residences in Earlhamgrove, Forest-gate. Mr. Edward Brown, architect:—

Maryon (accepted)	£1,534	0	0

For farm offices at Kyle Court, co. Wexford. Mr. W. Fogerty, architect:—

Ryan & Son	£2,975	0	0
Gahan	2,900	0	0
Jackson	2,350	0	0
Wilkinson	2,250	0	0
Redmond*	2,165	0	0

* Accepted, with some modifications.

For alterations and additions, including new chapel to the infirmary, Hertford. Mr. T. T. Smith, and Messrs. Smith & Austin, architects. Quantities supplied:—

	Additions.	Chapel.
Prout	£2,306	£610
Groome	1,763	570
Cook	1,748	533
Ginn	1,714	475
Rkin & Son (accepted)	1,668	472
Hampton, jun.	1,612	525

For the erection of coach-house, stables, &c., St. Helen's-road, Kite's Nest, Ore, near Hastings, for Mr. Thomas John Hughes, M.D. Messrs. Wm. Goaling & Son, architects. Quantities by the architects:—

Gilson & Guthrie	£450	0	0
Phillippe & Co.*	389	0	0
Stubberfield	385	0	0
Prior & Barker	380	15	0

* Accepted, subject to alterations.

For finishing joiners' work, building vestibule, &c., to the mansion:—

Phillippe & Co. (accepted)	£398	16	0

For the erection of a block of twelve houses in Trevor-street, Hirder Estate, Wrexham. Mr. John Cox Dear, architect:—

Lamble	£4,343	0	0
Samuel	3,978	0	0
Huxley	3,791	0	0

For the erection of new wing to the Blind School, St. John's Wood. Mr. Charles Bell, architect. Quantities by Mr. Henry Lovegrove:—

Tavenor & Sons	£3,782	0	0
Burford	3,570	0	0
Nightingale	3,513	0	0
Tarrant & Sons	3,400	0	0
Scrivener & White	3,389	0	0
Woodward	3,387	0	0
Bywater	3,379	0	0
Aitchison & Walker	3,028	0	0

For the erection of house at Lincoln for Mrs. Whelpton. Mr. Chas. Bell, architect. Quantities by Mr. Henry Lovegrove:—

Martin & Son	£1,260	0	0
Young	1,102	0	0
Brooks	1,069	0	0
Cohen & Thompson	990	0	0

For the erection of Board schools, with master's residence, for the Whaplode School Board, Lincolnshire. Mr. Chas. Bell, architect. Quantities by Mr. Henry Lovegrove:—

Fawn	£1,633	0	0
Stanger & Watson	1,565	0	0
Sharp & Birchfield	1,525	0	0
Everson	1,503	0	0
Gilder	1,432	0	0
Hobson & Taylor	1,428	0	0
Priest, Bros.	1,420	0	0
Dawson	1,407	0	0
Three of the lowest submitted amended tenders:—			
Gilder	£1,222	17	0
Dawson	1,202	7	0
Hobson & Taylor (accepted)	1,197	0	0

For decorations and repairs to the Wesleyan Chapel, Long-lane, Southwark. Mr. Chas. Bell, architect:—

Colls & Son	£777	0	0
Tarrant & Son	744	0	0
Woodward	750	0	0
Aitchison & Walker	550	0	0
Pontio	524	0	0

For new infirmary at Consett (co. Durham), for the Consett Iron Company (Limited). Messrs. John Smith & Son, architects:—

Westgairth (accepted)	£2,571	0	0
Heating, &c.			
Dinning & Cooke	115	0	0

For schools for 700 children, with master's house, &c., at Dipton (co. Durham), for the Collierley School Board. Messrs. John Smith & Son, architects:—

Armstrong	£6,843	6	6
Smith	6,342	7	0
Handcock & Hutcheson	5,410	0	0
Gibson & Mordue (accepted)	5,336	13	0

For additions to a warehouse in Little Alie-street, Whitechapel, for Messrs. Hewlett & Son. Messrs. E. Habershon & Brock, architects:—

Sabey & Son	£1,300	0	0
Brass	1,251	14	6
Browne & Robinson	1,103	0	0
Mattock, Bros.	1,190	0	0
Lost & Co.	1,150	0	0
Newman & Mann	1,091	0	0
Bowman	1,079	0	0
Ennor, Julian, & Co.	1,030	0	0

For the erection of a stock exchange, for the Liverpool Stockbrokers' Association. Mr. Henry Sumners, architect. Quantities supplied. The tenders to state time of completion under a penalty:—

Wells & Son	£22,475	0	0
Morrison & Son	21,560	0	0
Holme & Nichol	21,436	0	0
Roberts & Robinson	21,350	0	0
Jones & Sons	21,270	0	0
Ridehalgh*	21,200	0	0
Lealie	21,143	0	0
Tomkinson & Son	20,997	0	0
Brown & Backhouse*	20,910	0	0
Haigh & Co.*	20,896	0	0
Urmson	20,766	0	0

Only the tenders marked * complied with the stipulation as to stating time, and that of Haigh & Co. was accepted,—time, fifteen months.

For the erection of nine shops and nine private houses, St. George's-in-the-East:—

Hook & Oldrey	£9,844	0	0
Carter & Sons	8,565	0	0
Ennor, Julian, & Co.	8,303	0	0
Battley	8,262	0	0
Burman	8,127	0	0
Lyons	8,050	0	0
Cooke	7,923	0	0
Webb & Co.	7,800	0	0
Judd & Hawkings	7,777	0	0
Palmer	7,734	0	0
Dover, Sons, & Co.	7,110	0	0
Moyle & Son	7,050	0	0

For the erection of premises at No. 243, Tottenham-court-road. Mr. John Hudson, architect:—

Patrick & Son	£5,180	0	0
Holland & Hannen (too late)	4,987	0	0
Scrivener & White	4,874	0	0
Little	4,872	0	0
G. H. & A. Bywaters	4,695	0	0
Keyes & Head	4,634	0	0

For the erection of a store and for alterations to stables at Bromley-by-Bow, for the Safety Oil Company (Limited). Mr. John Hudson, architect:—

	Store.	Stables.
Little	£1,331	£210
Jacobs	1,320	174
Bangs & Co.	1,299	165
Morter	1,256	198
Norton & Son	1,155	179

For repairing and repainting externally the Licensed Victuallers' Schools, Upper Kennington-lane. Mr. J. W. Reed, architect:—

Smith	£365	0	0!
Bayes, Bros., & Allen	265	0	0
Grimwood & Sons	174	0	0!

For the whole of the works to new relief stations, Lee-green, Lee, and Exchequer-place, Lewisham, for the Lewisham Board of Guardians:—

Bulford (accepted).

For the restoration of Woodbastwick Church, Norfolk. Sir Gilbert Scott, architect. Quantities not supplied:—

Dobson	£4,444	0	0
Newell	3,836	10	0
Thompson	3,347	0	0
Chapman	3,028	0	0
Rust & Son	2,800	0	0
Hawes	2,720	0	0
Durrant	2,710	0	0

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